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ABSTRACT

The experimental 1973-74 edition of Unit V consists of 35 life science curriculum activities intended for 13- to 16-year-old educable mentally handicapped adolescents. The role of the teacher in continuing field trials is noted and environmental themes and elements, inquiry skills, problem solving skills, and applicational behaviors and attitudes are stressed. Directions for using the student records-or-progress and tallysheets are provided for the teachers. The seven cores of activities are preceded by suggestions of general aims (e.g., student development of a success syndrome and development of some control over the environment), specific goals, objectives and a planning guide listing materials needed for each activity. Cores A through D--which focus on needs, sources, processes and management associated with water--contain 21 activities with titles such as (1) Living Things Are Mostly Water; (2) A Trip to the Water Plant; and (3) Microbes in Water. Titles for the 14 activities contained in cores E through G--on components, change agents and additives in air--include: (2) Testing for Carbon Dioxide and Oxygen; (2) Weather and Air; and (3) Do We Need a Filter On Our Town? Activities are organized in terms of materials, teaching strategies, and anticipated student behavior. An evaluation/feedback form accompanies each activity. (MC/SM)

ED 087189

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A SPECIAL EDUCATION

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EXPERIMENTAL EDITION

UNIT V

Air And Wa
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Biological Sciences Curriculum Study

Unit 5

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A SPECIAL EDUCATION PROGRAM

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EXPERIMENTAL EDITION 1973-74

UNIT V

Air And Water In My Environment

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ME AND MY ENVIRONMENT STAFF

CONSULTANTS

Thomas E. Allen
Dorothy S. Curtis
Roy O. Gromme, Project Director
Jill R. Nagrodsky
Charles E. Robinson
Norris M. Ross, Jr.
Harold A. Rupert, Jr.
Joe M. Steele

ARTISTS

Maryann Amicarella
Bill Armbruster
Louis L. Bruno
Judith A. Bucher
Mike Morrell
Lana M. Widener
John B. Thornton, Art Supervisor

ME AND MY ENVIRONMENT STAFF

BSCS

RTISTS

aryann Amicarella
ill Armbruster
ouis L. Bruno
udith A. Bucher
ike Morrell
ana M. Widener
ohn B. Thornton, Art Supervisor

SECRETARIES

Eileen Burke
Melissa Cooney
Lynn Zarina

SUPPORT STAFF

Elliott Asp
Ray Fisher
Joanne Klebba
Karen Lucas
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TZ
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TOLMAN

FICE

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EIL

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Art Director

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KATHRYN GIBERMAN
TED GRANT
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EVALUATION CONSULTANTS

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University of Illinois Medical Center
Chicago, Illinois

ROBERT ENNIS
University of Illinois
Urbana, Illinois

JAMES J. GALLAGHER
University of North Carolina
Chapel Hill, North Carolina

GENE V. GLASS
University of Colorado
Boulder, Colorado

ERNEST R. HOUSE
University of Illinois
Urbana, Illinois

JAMES A. JONES
Syracuse University
Syracuse, New York

WILLARD JONES
Rocky Mountain Special Education
Instructional Materials Center
Greeley, Colorado

OLIVER KOLSTOE
University of Northern Colorado
Greeley, Colorado

MARLYS MITCHELL
University of North Carolina
Chapel Hill, North Carolina

DOUGLAS SJOGREN
Colorado State University
Fort Collins, Colorado

ME AND MY ENVIRONMENT COMMITTEES

JAMES A. JONES
Syracuse University
Syracuse, New York

WILLARD JONES
Rocky Mountain Special Education
Instructional Materials Center
Greeley, Colorado

OLIVER KOLSTOE
University of Northern Colorado
Greeley, Colorado

MARLYS MITCHELL
University of North Carolina
Chapel Hill, North Carolina

DOUGLAS SJOGREN
Colorado State University
Fort Collins, Colorado

PROJECT ADVISORY COMMITTEE

WILLIAM R. REID, Chairman
University of Florida
Gainesville, Florida

ROBERT L. ERDMAN
University of Utah
Salt Lake City, Utah

WARREN E. HEISS
Montclair State College
Upper Montclair, New Jersey

JERRY H. HURSCHMAN
Wright State University
Dayton, Ohio

EDWARD L. MEYEN
University of Kansas
Lawrence, Kansas

SUMMER WRITING TEAMS 1971-73

1971 SUMMER WRITING TEAM

THOMAS E. ALLEN
Florida State University
Tallahassee, Florida

JOSEPHINE A. BENNETT
Whitehaven High School
South Memphis, Tennessee

DONALD R. DAUGS
University of Victoria
Victoria, B.C., Canada

FLORENCE B. HAAG
Ida Patterson School
Eugene, Oregon

CREGG INGRAM
Southwest Educational
Development Center
Cedar City, Utah

JO ANN JEPPSON
Granite Park Jr. High School
Salt Lake City, Utah

KEITH MORRILL
South Dakota State University
Brookings, South Dakota

NORRIS M. ROSS, JR.
Nicolet High School
Milwaukee, Wisconsin

WILLIAM G. VOLANTE
Turkey Hill Middle School
Lunenburg, Massachusetts

MARTHA M. WILLIAMS
Kepner Jr. High School
Denver, Colorado

1972 SUMMER WRITING TEAM

WALTER AUFFENBERG
Florida State Museum
Gainesville, Florida

WILLIAM EDWARDS
Laramie Co. Community College
Cheyenne, Wyoming

WREN GREEN
University of British Columbia
Vancouver, B.C., Canada

FLORENCE B. HAAG
Ida Patterson School
Eugene, Oregon

JERRY NUSSCHMAN
Wright State University
Dayton, Ohio

CANDACE LIG
Hodgkins J
Westminste

KEITH MORRI
South Dako
Brookings,

ALICE OGURA
Balarat En
Denver, Co

JOAN PETERS
Boulder, C

NORRIS M. RO
Nicolet Hi
Milwaukee,

1973 SUMMER

JUNE ALLBRAN
Lake Jr. H
Denver, Co

LOUIS CLERIC
Hillside J
Montclair,

STELLA CUBBI
Boulder, C

SUMMER WRITING TEAMS 1971-73

BSCS

VOLANTE
Hill Middle School
rg, Massachusetts

WILLIAMS
r. High School
Colorado

R WRITING TEAM

FENBERG
State Museum
lle, Florida

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, Wyoming

ty of British Columbia
r, B.C., Canada

. HAAG
erson School
Oregon

CHMAN
tate University
Ohio

CANDACE LIGHT
Hodgkins Jr. High School
Westminster, Colorado

KEITH MORRILL
South Dakota State University
Brookings, South Dakota

ALICE OGURA
Balarat Environmental Center
Denver, Colorado

JOAN PETERS
Boulder, Colorado

NORRIS M. ROSS, JR.
Nicolet High School
Milwaukee, Wisconsin

1973 SUMMER WRITING TEAM

JUNE ALLBRANDT
Lake Jr. High School
Denver, Colorado

LOUIS CLERICO
Hillside Jr. High School
Montclair, New Jersey

STELLA GUBBINS
Boulder, Colorado

FLORENCE B. HAAG
Ida Patterson School
Eugene, Oregon

WARREN HEISS
Montclair State College
Upper Montclair, New Jersey

JERRY HUBSCHMAN
Wright State University
Dayton, Ohio

KEITH MORRILL
South Dakota State University
Brookings, South Dakota

GEORGE NOWAK
James Madison High School
San Diego, California

MARY SMITH
James Shepard Jr. High School
Durham, North Carolina

CANDACE LIGHT
Hodgkins Jr. High School
Westminster, Colorado

TEST TEACHERS, FIELD TEST I, 1971-74

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Sentinel High School
Missoula, Montana

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Goleta Valley Jr. High School
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Boulder, Colorado

JO ANN JEPPSON (1971-72)
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Cole Jr. High School
Denver, Colorado

CANDACE LIGHT (1971-73)
MARY FREEMAN (1973-74)
Hodgkins Jr. High School
Westminster, Colorado

CECIL L
Roose
Eugen

RICHARD
Shado
Arlin

EDWARD
Mon V
West

THOMAS
Frank
Las V

MARY D.
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Durha

FRED ST
Nathan
Des M

AUGUST
CARLA W
UNC L
Greel

TEST TEACHERS, FIELD TEST I, 1971-74

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CECIL LINDER (1971-74)
Roosevelt Jr. High School
Eugene, Oregon

RICHARD MATHIS (1971-74)
Shadowlawn Learning Center
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Intermediate School 148
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Evanston, Illinois

MOLLIE KITE
The Pathfinder School
Bethel Park, Pennsylvania

VITO LOMBARDO
F. D. R. Middle School
Bristol, Pennsylvania

DOUGLAS McCULLOUGH
L. Y. Cairns School
Edmonton, Alberta, Canada

EDWARD McNULTY
Eastwood School
Syracuse, New York

JOAN McNULTY
Central Jr. High School
DeWitt, Iowa

EVA REEDY (1972-73)
MOLLIE McCARTHY (1973-74)
Benjamin Franklin Jr. High School
San Francisco, California

EDWARD SHERMAN
Intermediate School 131
Bronx, New York

HOWARD SHIPLEY
Judson Hill School
Morristown, Tennessee

TEST TEACHERS, FIELD TEST II, 1972-74

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VITO LOMBARDO
F. D. R. Middle School
Bristol, Pennsylvania

DOUGLAS McCULLOUGH
L. Y. Cairns School
Edmonton, Alberta, Canada

EDWARD McNULTY
Eastwood School
Syracuse, New York

JOAN McNULTY
Central Jr. High School
DeWitt, Iowa

EVA REEDY (1972-73)
MOLLIE McCARTHY (1973-74)
Benjamin Franklin Jr. High School
San Francisco, California

EDWARD SHERMAN
Intermediate School 131
Bronx, New York

HOWARD SHIPLEY
Judson Hill School
Morristown, Tennessee

EDITH SHIPMAN
Pacific Prevocational School
Seattle, Washington

BETTY SILVERTHORN
Selah Jr. High School
Selah, Washington

JOSEPH SOUSA, JR.
Harrington Way Jr. High School
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Denver, Colorado

MARY WHITE
Shawnee Jr. High School
Louisville, Kentucky

SUE WRIGHT
West Locust Street School
Wilmington, Ohio

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Me and my·
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INTRODUCTION

The project to develop a life science curriculum for the educable mentally handicapped (EMH) was originally funded in the summer of 1969 by the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. The project is charged with writing, field testing, evaluating, and disseminating materials dealing with topics in life sciences for the EMH population in our schools.

ME NOW, the BSCS model life science program for educable mentally handicapped youngsters in the 11- through 13-year age-group, has bee
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On the basis
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Recognition by the
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DEVELOPMENT

Summer, 1971 - Initial writing conference

Academic year, 1971-72 - Initial testing

Summer, 1972 - Revision

Academic year, 1972-73 - Large-scale field test

Summer, 1973 - Revision

Academic year, 1973-74 - Conclusion of field test

Fall, 1973 - Unit

Spring, 1974 - U

Fall, 1974 - U

Spring, 1975
Environment

Fall, 1975

Spring,

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age-group, has been released and is available from Hubbard Scientific Company of Northbrook, Illinois.

On the basis of the success of the ME NOW program, and in anticipation of meeting further student and instructor needs, the Bureau of Education for the Handicapped has provided the BSCS with a three-year continuation grant to develop model materials for 13- to 16-year old EMH students. Recognition by the educational community of the need for special emphasis on matters of environmental concern led the BSCS staff to decide early in the project that a portion of the materials for EMH students should focus on environmental studies. The time line for developing this new curriculum, which is entitled ME AND MY ENVIRONMENT, is shown below.

COMMERCIAL RELEASE

Fall, 1973 - Unit I, Exploring My Environment

Spring, 1974 - Unit II, Me As An Environment

Fall, 1974 - Unit III, Energy Relationships In My Environment

Spring, 1975 - Unit IV, Transfer And Cycling Of Materials In My Environment

Fall, 1975 - Unit V, Air And Water In My Environment

Spring, 1976 - Unit VI, Populations And Societies

THE ROLE OF THE TEACHER IN THIS EXPERIMENTAL EDITION

This curriculum has been written for and by teachers; it was tested and modified by teachers. enthusiastic teachers for this development, testing, and modification. Twelve of these teach Thirty-nine more were selected as experimental teachers to provide the best possible field te providing feedback for the revision depended heavily upon the resourcefulness of these teache

In the continuing field trials, teachers have several responsibilities, including:

1. Implementing the strategies and activities exactly as they are written. Only when all te analysis of results be depended upon to reveal strengths and weaknesses of the program.

2. Developing a feel for the inquiry strategy, the flow of activities, and the ultimate stud around. Through their understanding of this rationale, the test teachers can make an inv some activities, the modification of others, and the invention of new ones that will enab

3. Providing timely, accurate, and detailed feedback that specifies strengths and weaknesses for each activity.

The following outline will provide you with an overview of the six major components of the pr

1. UNITS IN ME AND MY ENVIRONMENT

UNIT I. EXPLORING MY ENVIRONMENT	UNIT II. ME AS AN ENVIRONMENT	UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT	UNIT IV. TRANSFE CYCLING MATERIA MY ENVI
Investigating the Visible Environment Landmarks in the Visible Environment Sensing the Invisible Environment Looking at the Invisible Environment	Microbes and Me Disease in People Environments Environmental Choices and Chances (Drugs, Alcohol, Smoking)	Introduction to Energy Energy in Food Energy Flow through Food Chains and Webs Food Making in Plants	Energy and Materi Transfer Decomposers in My Environment Garbage and My Environment

BSCS

it was tested and modified by teachers. The BSCS has found highly skilled, flexible, and and modification. Twelve of these teachers served as writers to help create the materials. ers to provide the best possible field test of the curriculum. The success of these tests in upon the resourcefulness of these teachers.

responsibilities, including:

ly as they are written. Only when all teachers use the curriculum as prescribed can the rengths and weaknesses of the program.

low of activities, and the ultimate student behaviors that the curriculum is organized onale, the test teachers can make an invaluable contribution by suggesting the extension of the invention of new ones that will enable their students to achieve the objectives.

that specifies strengths and weaknesses, modifications, alternatives, and student responses

ew of the six major components of the program:

T III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT	UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT	UNIT V. AIR AND WATER IN MY ENVIRONMENT	UNIT VI. POPULATIONS AND SOCIETIES
roduction to Energy rgy in Food rgy Flow through ood Chains and Webs d Making in Plants	Energy and Material Transfer Decomposers in My Environment Garbage and My Environment	Uses of Water Sources of Water Preparation of Usable Water Water Management Components of Air Changes in the Air Additives in Our Air	Interactions within a Population Population Size and Complexity Effects of Overpopulation Population Control

Me and my
Environment

2. ENVIRONMENTAL THEMES

- Interrelationships of Environmental Components
- Diversity and Patterns
- Complementarity of Organisms and Environment
- Flow of Energy
- Cyclic Nature of Processes
- Finiteness of Resources
- Ecological Trade-Offs
- Interrelationships of Environmental Components
- Population Dynamics

3. ENVIRONMENTAL ELEMENTS

- Space
- Shelter
- Living Things
  - (Plants)
  - (Animals)
  - (Microorganisms)
- Energy
  - (Food Chains)
- Air
- Water
- Man

4. INQUIRY SK
according
difficulty

- Observing
- Identifyin
- Associatin
- Describing
- Comparing
- Translatin
- Inferring
- Applying
- Predicting
- Speculatin
- Value Judg
- Comparing

ENTAL ELEMENTS

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s)
s)
rganisms)

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4. INQUIRY SKILLS (Ordered according to assumed difficulty level)

Observing

Identifying

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Describing

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Value Judging

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5. PROBLEM-SOLVING SKILLS

Experimenting

Knowing What the Problem Is and What to Do to Solve It

Recording Data

Discussion and Treatment Of Group Data

Organizing Data

Explaining, Defending, Answering Why Questions

Asking Questions

Identifying Variables

Identifying Controls

Interpreting Results

Drawing Conclusions

6. APPLICATIONAL BEHAVIORS AND ATTITUDES (No order of importance is intended)

The student develops:

--vocabulary skills.

--a success syndrome.

--skills of observation.

--an attitude of inquiry.

--a sense of self-identity.

--skills in conserving water.

--skills in the hygienic care of his own body.

--skills in participating in group discussions.

--the ability to manipulate water treatment systems.

--skills in applying science experiences to everyday life.

--skills in the selection, preparation, and storage of food.

--a recognition of his own role in creating an acceptable life style.

--an ability to distinguish between healthful and unhealthful environments.

--an appreciation of the community service provided by public utility systems.

--an understanding of the interrelationships between environmental components.

--skills in functional, receptive, and expressive communication about his environmen

--skills in employing systematic problem-solving techniques to persistent problems o

--skills in recognizing environmental landmarks and utilizing these for orientation

--a recognition of his social dependence on others and his biological dependence on

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Me and my Environment

In May 1971, a planning conference was held to prepare guidelines for the development of ME AND MY ENVIRONMENT. The conference was attended by the five members of the advisory committee, four of whom are in the field of special education and the fifth in biology; by the project writing team, consisting of five special education teachers and five biology teachers; and by the BSCS project staff. Conferees developed guidelines covering areas of environmental concern and utility for the target population of children, the characteristics of this population, and the needs of these children that might be met through environmental studies. A multidimensional model incorporating the science content, cognitive and affective behaviors, environmental themes, contextual focus, and needs of the children resulted from the planning conference. Following the conference, the BSCS project staff prepared a proposed content and objective outline for the curriculum. A thorough study was made of the existing literature covering the physical, social, and psychological needs of handicapped adults; the staff then attempted to identify which of those needs might be met by ME AND MY ENVIRONMENT.

SOME GENERAL OBJECTIVES

The identification of needs led to a statement of general objectives. The first four were adopted as a broad benchmark against which all activities were judged.

1. To help the mentally handicapped child develop interests, skills, and positive attitudes through experiences with scientific - especially biological - concepts.

2. To provide the mentally handicapped child with challenging intellectual activity at a level commensurate with his ability to respond effectively.

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3. To aid the child in establishing functional modes of living through heightened observation, a well-developed curiosity, an increased measure of self-confidence, and a sense of responsibility to and for his environment.

4. To contribute to the development in the child of a higher level of social maturity and emotional stability that can lead to increased vocational proficiency, realistic self-concept, creative self-expression, and more effective assimilation into the community.

5. To develop in the child a knowledge of himself in relation to his environment, along with a tendency to apply this knowledge to the tasks of everyday living.

6. To contribute to increased knowledge about the learning characteristics and limitations of the educable mentally handicapped pupil, and about effective strategies for instruction.

BASIC ASSUMPTIONS UNDERLYING THE DESIGN FOR THE CURRICULUM MATERIALS

In the initial discussions with the special education community, some basic assumptions for the development of the life science materials were identified. These were revised somewhat, based on the development and testing of ME NOW, to form the underlying assumptions for the development of ME AND MY ENVIRONMENT.

1. Ideas must be developed with a minimum of reading on the part of the student.

2. Vocabulary, where possible, should involve *functional* rather than *technical* language, although technical names are taught when these may be useful to the student.

3. Entry points should be concerned with concrete, tangible "things," rather than with abstract, intangible ideas or concepts.

4. The classroom environment and the materials should not be cluttered with distractors; however, a variety of perceptual modes and instructional media should be used (e.g., sight, touch, smell, etc.).

5. Activities should be developed in small, discrete units that build on or reinforce a concept or skill.

6. Learning, for the EMH student, requires slower pacing, greater redundancy, and time for participation by each student. The instructional materials should be student-doing rather than student-watching.

7. An activity must involve the student in ways of applying the desired behavior; transfer cannot be assumed.

8. EMH children need, and can respond effectively to, an activity-oriented instructional approach.

9. The curriculum should be designed to provide students with an experience in science as inquiry, through the exploration of their environment.

10. Most teachers of the Educable Mentally Handicapped will need specific directions in using inquiry strategies for teaching science concepts.

11. The teachers of the Educable Mentally Handicapped, for the most part, are not science-oriented; therefore, the materials should be specific with regard to science techniques.

12. The materials and methods must permit or provide attention to individual differences and to specific learning characteristics of the population.

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13. To achieve the objectives, designers of the materials should attempt to create a balance between detail and motivation; that is, the amount of minute and abstract detail that can be learned is probably a function of the interest and motivation that can be established to deal with it.

MAJOR AIMS FOR ME AND MY ENVIRONMENT, A JUNIOR HIGH EMH SCIENCE CURRICULUM

The curriculum includes instruction related to the personal well-being, self-worth, confidence, and successful coping of each person to meet persistent daily life problems. The major aims are:

1. Development in each child of a sense of identity as a person who has some degree of control over and can act on his environment. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.

2. Development in each child of a success syndrome. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility - almost obligation - to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. As a group, the students should help each individual fit what he has done into a pattern of accomplishment.

The curriculum is intended to be intellectually stimulating, and exploratory for each student, and to induce him to become actively involved. It should encourage the following outcome:

3. Development in each child of an interest that could become a hobby or avocation over a lifetime (through an exposure to an array of experiences in science). It is hoped that many children will find some

area - perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country - that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

The curriculum is organized around eight ecological themes. There are some specific content objectives related to these. The ultimate objectives are:

4. Development in each child of a sense of relationship and empathy with other living things. It is hoped this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. Development in each child of an understanding of environmental conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.

These are the five overriding aims that should serve as reference points for teachers and guide much of what they plan to do in the classroom. One of the older junior high students in a first-year test class expressed his feelings about the class and himself in this way: "I just feel that if we want these kids to improve, and that's the whole idea of it, you have to bring these kids a certain amount of happiness. You have got to make them feel that they are really wanted. If they are wanted, they will try a little harder. That sounds kind of childish, I suppose, but it works...Another thing...always inspire: 'Come on, put your best foot down - try it again.' You know, things like that. I mean, to me, just the tone of voice makes the difference to me about going out or staying in the class. I just feel that they don't want me - and they don't, (when their tone says) 'Oh, Eddie! Why did he have to come today?' "

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ENVIRONMENTAL THEMES

Since the original planning conference for the development of ME AND MY ENVIRONMENT, eight ecological themes have emerged which seem to encompass the major ideas and concepts (i.e., the science concept) that the curriculum development team sees as appropriate for this student population. These themes are broad generalizations, some understanding of which appears to be a prerequisite for coping with one's own environment as well as with society's environmental problems. The themes are probably best thought of as unifying threads which run throughout the curriculum.

1. INTERRELATIONSHIPS OF ENVIRONMENTAL COMPONENTS

> *When we try to pick out anything by itself, we find it hitched to everything else in the universe.* John Muir

Life is entirely dependent upon the things that the environment supplies: air, water, food, shelter, and subtle things such as a suitable temperature and humidity. Animals depend upon other animals or plants for food. Scavengers (carrion and detritus feeders) and decomposers (bacteria and fungi) obtain their nutrition from the remains of living organisms. Green plants depend upon sunlight, air, water, and minerals from their environment and form the base upon which all organisms are interconnected by food chains and complex food webs.

Organisms interact with each other, and with the environment, in a variety of ways in addition to the eater-eaten relationships of food chains or webs. Plants compete with each other for light, water, soil nutrients, and growing space. Animals compete for available food resources, space, and shelter. Other relationships include parasite-host and pathogen-host interactions.

The important consequence of this theme is that actions are not singular, nor do they have singular impact. Man's competitive interactions have far-reaching, often unknown consequences. For example, clearing land for raising agricultural crops destroys the habitat for plants and animals and disrupts certain food webs, while establishing a suitable habitat for agricultural species. The resulting monocultures are often vulnerable to attack by pests because populations of natural predators have been removed. Attempts to control these competitive organisms through applications of pesticides may simply aggravate the situation by killing nontarget organisms such as predators, scavengers, and decomposers which are actually beneficial. Similarly, herbicides used in control of weeds which are competing with crops may destroy habitats for natural predators, making additional applications of insecticides necessary; these in turn may kill more nontarget beneficial organisms. Numerous studies have shown that large-scale, indiscriminate use of pesticides may, in the long run, actually decrease agricultural productivity. In addition, manufacture, transport, and application of pesticides and fertilizers contribute to air and water pollution, thereby adding to the degradation of vital resources upon which all life depends. This is but one simple example of a myriad of possibilities. If we expect students to start thinking in terms of consequences, it is imperative that they realize and appreciate that life depends upon interrelationships and that apparently simple actions may have far-reaching implications.

2. DIVERSITY AND PATTERNS

There is great diversity in the environment. Differences in climate and topography lead to different environments with different communities of plants and animals. The plants and animals differ as they have become adapted to do somewhat different things, or even to do similar things but in different environments. Even within one species there is diversity. But it is possible to find patterns within all this diversity. Recognizing patterns helps one get his head around a bewildering variety of things. All environments have
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If one looks at the organisms in any habitat, he discovers a variety of sizes, shapes, and colors. Further examination will reveal groups of organisms that are related in various ways; e.g., some produce food (producers) while others feed upon these producers (consumers). We find that the organisms are all related in a pattern forming a food web.

Diversity is thought to enhance the stability of a system, for it provides alternate channels of energy or materials flow if part of the system is lost or overburdened. For example, consider a single food chain: plants, grasshoppers, frogs, snakes. If one link in the chain is lost - e.g., the grasshoppers are wiped out by insecticides - all links beyond that one will also be lost if they have no alternative sources of food. In a complex food web, however, a link may be lost without destroying the system; links beyond the missing one may turn to another channel for food - and in the example, the frogs may exploit another type of insect food resource. Thus, preserving diversity may be necessary in preserving the stability of the life-support system of the biosphere. Man cannot exist alone.

It is often said that variety is the spice of life. Diversity makes the environment less monotonous and more interesting. This aesthetic component should receive emphasis in the curriculum.

3. COMPLEMENTARITY OF ORGANISMS AND ENVIRONMENT

A complement is something that completes or fills out another thing. Complementarity in this context refers to the completion each part brings to the other, when each is dependent upon the other. Some interdependent relationships have two components; others three, four, ten, or even a hundred or more. A few examples should clarify the meaning of the theme.

Organisms use material things from the environment and, in turn, recycle things back to the environment, where they may be used by other organisms. Thus, the presence of organisms modifies the environment in various ways, some of which make the environment more suitable for other organisms. Plants use carbon dioxide and release more oxygen than they use. Consumer organisms (animals, decomposers) use oxygen and release carbon dioxide. Both the producers and consumers are dependent upon the environment for these resources, and the balance of these materials in the environment is likewise dependent upon both groups of organisms.

Without scavengers and decomposers there would be a prodigious accumulation of the remains of once-living organisms cluttering up the environment. Probably all of the available carbon, oxygen, and other essential elements would be tied up in these dead remains. Life would have come to a screeching halt a long time ago!

The presence of plants improves the water-holding capacity of a watershed and helps prevent erosion of the soil by wind and water. Plants reduce the rate of evaporation of soil water but at the same time release it to the atmosphere. Thus, plants play a vital role in the water cycle and influence local climates through the regulated flow.

Plant succession is a classic example of complementarity. An abandoned field, new roadside, or similar disturbed area is quickly invaded by hardy pioneer plants which we usually think of as weeds. As these grow, die, and decay, they modify the immediate environment and are replaced by plants which are better adapted to the new conditions. These, in turn, cause further modifications and are replaced by other populations; finally a relatively stable community exists that is able to replace itself and that is in dynamic equilibrium with the environment. Such communities are usually referred to as climax communities.

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4. FLOW OF ENERGY

> *The biotic stream is capable of flowing in long or short circuits, rapidly or slowly, uniformly or in spurts, in declining or ascending volume. Ecology calls this sequence of stages in the transmission of energy a food chain, but it can be more accurately envisioned as a pipe line...(which) leaks at every joint.* Aldo Leopold

Energy is required to do work; that is, to cause movement requires energy. Indeed, to do anything requires energy. Life depends upon this continuous flow which is initiated by a constant input of energy from the sun, its photosynthetic transformation from light to chemical energy by the producer organisms (green plants), its passage from organism to organism along various food chains (in their more complex food webs), and its eventual loss as radiant heat to outer space. Each time that energy is converted or transformed, at each step along the way, some of it is lost from the system and is no longer available to do useful work. This, in simple terms, is the second law of thermodynamics. Green plants are able to fix photosynthetically only a portion of the sun's energy that they intercept. In turn, some of the energy which they trap and store is used by the plants for such things as growth, reproduction, and the movement of materials. Thus, only a portion of that original stored energy is available to the organisms which eat the plants. These organisms likewise use energy in their various life processes so that only a small portion of the energy which they received from eating plants is available to their predators. As a consequence, only about one-tenth of the energy at any step in a food chain is available to the next level. An acre of agricultural land will provide enough food energy for about 1.5 persons for a year if planted in wheat, but will feed only 0.1 person if used to raise beef cattle!

Society's use of fossil fuels is simply a utilization of energy captured and stored over millions of years by green plants. As such, this source of energy is in finite supply and is a nonrenewable resource.

Electricity generated by fossil fuel-burning plants can similarly be traced to the sun. Hydroelectric plants offer a limited alternative source of electricity. This source is also finite because of the limited number of adequate sites. The planned use of nuclear fusion reactors (which are simply a duplication on earth of the natural processes taking place on the sun to release energy) offers an alternative source of energy (again sought as electrical energy) for society; this source, however, as with all others, is governed by the laws of thermodynamics. The energy, once released, flows through the system and is eventually lost to space as heat. Hence this source is also finite, but it is a very large source. The exploitation of nuclear energy is fraught with unanswered questions and problems. How can we safely contain and shield the radioactive processes of fusion? How can we safely dispose of the radioactive wastes from the "temporary" fission reactors being used until fusion reactors, which produce little waste, are perfected? Can the earth dissipate the huge amounts of waste heat generated? What effects will this heat have on climates, ecosystems, and organisms?

It should be emphasized that nuclear energy offers little hope, at present, of replacing the sun as a life-supporting source of energy. In the forseeable future, man's only source of food energy will be the sun, through photosynthesis of green plants.

5. CYCLIC NATURE OF PROCESSES

All the rivers run into the sea, yet the sea is not full. King Solomon

In contrast to energy, materials (matter) are continuously recycled from living to nonliving systems and back to living systems again. Materials necessary for life are in finite supply, and if they were not constantly cycled, life would simply run out of resources and cease. Some examples include the water cycle, the carbon dioxide-oxygen cycle, the nitrogen cycle, and the cycling of various essential minerals such as

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Man's present exploitation of consumable resources, in most cases, upsets these natural cycles. The manufacture and ultimate discarding of nonbiodegradable products removes important elements and compounds from the natural cyclic processes of the ecosphere and could ultimately lead to the exhaustion of such resources for the life-support system. Burning of fossil fuels is changing the natural balance of carbon dioxide in the atmosphere, with the consequences largely unknown. Degradation of air and water through pollution and the application of pesticides destroys organisms which are vital to cyclic processes.

6. FINITENESS OF RESOURCES

Everything has to come from somewhere. The earth has been likened to a spaceship because of its finite supply of all material resources. Inasmuch as life depends upon a continued supply of resources, things have to be used over and over. Continued exploitation of any resource will lead to its exhaustion unless that resource is recycled. The demands of today's technological societies are placing tremendous burdens on the earth's resources and, at the same time, the wastes generated are making other resources unavailable or unfit for supporting life. Projections indicate that we will have depleted our supply of fossil fuels and several important metal resources early in the next century.

Through photosynthesis, food is a renewable resource so long as the natural cycles are able to resupply the raw materials necessary, and so long as environmental conditions necessary for plant life are maintained. But, the amount of food that can be produced on the earth at any one time is finite! There is only so much area available, only so much sunlight that can be intercepted, and only so much of the required raw materials available.

The consequence of this theme is that an indefinite continuation of growth and an increasing use of resources is impossible when the supply of all resources is finite. This is true of population, food consumption, resource utilization, technology, gross national product, or any other parameter which one chooses to measure. And all noteworthy predictions indicate that we are very rapidly reaching the limits of growth. Most of us will probably experience the dire consequences!

7. POPULATION DYNAMICS

A population refers to a collection of individuals of the same species occupying a given space at a given time. The size of living populations is determined by four factors: rate of birth, rate of death, rate of immigration, and rate of emigration. Populations tend to grow geometrically (e.g., 2, 4, 8, 16, 32,...) to the limit (carrying capacity) of their environment as determined by the available food, space, predation, and disease. They then either level off and exist in some fluctuating equilibrium with other populations, or they crash back to some low level. A common misconception is that all biological populations tend to follow the first pattern: growth which is described by an S-shaped curve up to the carrying capacity, followed by a fluctuating equilibrium. There are, however, many biological populations which dramatically overshoot the carrying capacity of their environment and, as resources are rapidly depleted crash back to a low population level. A blowfly population is a good example of the latter. Upon arrival at a carcass, the population increases rapidly, completely overshooting the carrying capacity or the environment's capacity to sustain the population for any appreciable length of time. As the food resource is quickly depleted, the population crashes back to the low level of a few adult flies who are searching out a new carcass to feed upon.

The strategy is simple - exploit the environment for all it's worth while it is here and hope that a few of the many adults produced in the process will survive long enough to make it to the next carcass. There is evidence that th
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is evidence that the characteristics of human population growth are similar to those described for the blowfly, and our present exploitation of the earth's resources is certainly analogous to the strategy employed by the blowfly. Such a strategy can only be disastrous for mankind. The earth is the only carcass we have.

Since resources are finite, no population can continue to grow forever. The human population has grown geometrically over the past few centuries. Doubling time of the human population is currently less than 35 years, and the most optimistic estimates indicate that this population will exceed the carrying capacity of Earth within a century (some suggest that we have already passed the carrying capacity and many demographers and ecologists have predicted a crash in the human population prior to the year 2020). *Population control and zero population growth will be accomplished*, either by self-imposed means or by natural means. If the latter, it will occur through starvation, disease, war, or lower fecundity - or a combination of these. There is no plausible alternative!

Perhaps the greatest service that this curriculum could hope to perform is to help this population of youngsters understand the implications of population growth and the necessity for limiting family size. But, to achieve the desired end, the curriculum must provide the students with an understanding of the ways and means by which family size may be controlled. This is one area where individuals can make decisions, can have an influence, and can contribute to the solution of what may be mankind's most pressing problem!

8. ECOLOGICAL TRADE-OFFS

Every coin has two sides.

As we have seen, all environmental components are interrelated in intricate, complex ways. No action has singular impact, and thus any course of action must be carefully weighed and alternatives considered. Any course of action involves ecological trade-offs.

For example, consider society's use of electricity. Many of us enjoy a life style which is very closely tied to the conveniences and labor-saving devices powered by electricity. The generation of that electricity is a major factor in environmental degradation. By and large, we have made the decision to forego a certain amount of environmental quality to enjoy the leisure and convenience of electrical appliances. Projections indicate that increases in demand for electrical power will require strip mining vast areas of Wyoming and Montana, exploiting oil shale reserves of Colorado, depleting the petroleum reserves of the Alaskan north slope (with the inherent dangers to the arctic tundra), and constructing large numbers of nuclear power plants. In all of these activities, we will trade off various amounts of environmental quality.

INQUIRY PHILOSOPHY

We do not view science as a collection of facts, but as a process by which facts are gathered, interpreted, and organized into conceptual schemes. We have included facts, and activities structured to generate facts, not for their intrinsic value but to provide the means by which concepts and generalizations are developed through an inquiry strategy.

Inquiry, simply defined, is finding out why. Inquiry may be defined as a process of questioning, or seeking information, of discovering. For EMH students, as for others, the excitement of discovery adds meaning to learning. Inquiry allows the student a natural avenue for satisfying his curiosity about his world. An inquiry strategy is one which poses a question or problem and then guides students through *inquiring kinds* of behaviors such as observing, describing, identifying, comparing, associating, inferring, applying, predicting, translating, guessing, speculating, creative thinking (divergent production), and value judging.

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All degrees of inquiry have a common ingredient: the answer is not given, but is arrived at by the individual after he has analyzed information relevant to the question. The distinction is obvious - in inquiry strategies the questions are answered by the students and not the instructor.

If knowledge is acquired, at least in part, through an inquiry strategy, then the student should be able to use that strategy in acquiring further information and solving future problems as they arise. He will be more able to seek answers to other questions through his ability to acquire and interpret information.

INQUIRY SKILLS

1. OBSERVING is a fundamental activity of scientists. The accumulation of information which may lead to knowledge comes primarily from what we see, hear, taste, smell, or touch. A major function of this curriculum should be to offer a rich and varied environment of concrete experiences for the students. As students gain experience, accuracy in observing and recording the details of their findings should be increased. Observing should frequently include an element of divergent production by asking the students to heed all of the details, extraneous and otherwise, that they can. Opinion, interpretation, and speculation are not, of course, a part of observing.

2. IDENTIFYING involves the recognition of what something is or of certain properties that make it possible to categorize the thing. Included in identifying is the matching of a name or definition with an object, the use of a key or guide, and the recall of a label from previous experience.

3. ASSOCIATING involves seeing what things go together - seeing relationships or recognizing common properties. Associating may be thought of as a prerequisite to classifying, or organizing data or information for some purpose. Grouping (classifying), through associating, may enhance conceptualizing.

4. DESCRIBING involves writing or relating orally all of the relevant observations about a thing so that another individual would be able to use the description to identify the object or share in an event he did not actually experience. Emphasizing description should enhance development of observational skills.

5. COMPARING involves the inspection of two or more objects (events) to note similarities and differences. It is closely related to the student's ability to distinguish between critical differences and to generalize recognizable similarities. This skill could involve the use of referents other than the things compared. It is necessary that one have an understanding of such comparatives as hotter-colder and smaller-larger, as well as a comprehension of their related values, e.g., warmer-cooler and littler-bigger.

6. TRANSLATING is the skill in which recorded observations are expressed in another symbolic form. The conversion of tabular information into a graph or of a verbal description into a drawing exemplifies this.

7. INFERRING involves going beyond the information or evidence at hand to presume a cause or an effect, or to answer a question. It requires extrapolation, may or may not be based on implication, and is closely related to two of the problem-solving skills: interpreting results and drawing conclusions.

8. APPLYING involves the use of a learned task or skill in a situation other than that in which it was originally learned. For example,

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if a child has learned to orient the top of one map with north, an application would be to orient another map with respect to north.

9. GUESSING is the generation of ideas about outcomes in a data-poor situation. The limited evidence, common sense and hunches are all involved in making the most informed judgment one can.

10. SPECULATING is the generation of ideas about the nature or outcome of a hypothetical situation. Even though the situation is unobserved, it may be reasonable to consider based on past experiences. Possibly a great deal is known about the subject - but without having observed the particular event, one must describe it from imagination.

11. PREDICTING is the skill of making informed estimates of what should happen in a given situation, based on knowledge of what enters into the situation and previous experience.

12. DIVERGENT PRODUCTION refers to the process of generating as many ideas about something as possible.

13. VALUE JUDGING involves more than simply expressing opinions or preferences. It is the comparison of things and the assignment of relative value to them, based upon some set of criteria. In this curriculum, the WHY of valuing should be sought.

PROBLEM-SOLVING SKILLS

Inquiry is the cognitive process of finding out WHY. The mechanism whereby this is accomplished is problem solving. The ME AND MY ENVIRONMENT science curriculum is a structured sequence of activities that enables the student, through success, to learn to seek the answers to WHY. It is hoped that the experiences provided in the curriculum will help the student face and solve the problems of everyday life, both now and later.

There are at least three levels of mastery of problem-solving skills. The miminum level is an *awareness* of the skills. The second level is the functional ability to perform them. The highest level is the ability to design an original experiment and carry it to completion. It should be borne in mind that problem-solving behavior is a complex package involving past experience, motivation, cognitive development, and other factors. The development of problem-solving skills should be closely related to the appropriate inquiry skills, concepts, and other organizers of the curriculum.

A brief description of the intended interpretation of the problem-solving skills follows in what we consider to be a hierarchy of easiest to most difficult.

1. EXPERIMENTING, or doing something to see what happens. This skill represents the use made of the opportunity to "mess around" with a given piece of apparatus or set of materials, to pursue individual curiosity or interest, to follow a suggested line of inquiry, and in general, to find things out.

Some examples of experimenting include: investigating the properties of environmental objects (e.g., which ones will float, which ones can be burned, which are natural and which are man-made), having the opportunity to use thermometers or balances, raising a classroom pet or plants, burning things under a pinwheel, comparing objects as sensed by touch and by eyesight, and so on.

It is important to distinguish between experimenting as we have defined it and the formal aspects of experiment and experimental design. Note that the formal aspects are dealt with as a separate category and that designing experiments is thought to be the most difficult of the problem-solving skills.

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To encourage development of the beginning skill of exploration or experimenting, instructions are frequently given in the following form: "Give the students an opportunity to manipulate and experiment with the balances." "Capitalize on student interest by letting everyone observe and handle the pets," and so on.

2. KNOWING what the problem is and what to do to solve it. Defining the problem and its parts clearly is an important first step in any problem-solving situation. Yet the recognition and definition of a problem represents a difficult task for this student population, and it has been placed high in the problem-solving skill hierarchy (see Number 12). Knowing or recognizing the problem *given guidance* (or the defining events and clues for everyday problems) is not as difficult, and students are assisted through many experiences in recognizing that a problem exists, in thinking about that problem, and in understanding how answers to it might be obtained. This skill must be emphasized (that is, understanding the problem) for the logical development of those skills which follow. The student must know the question under investigation and clearly comprehend the methods to be used in attempting to answer that question. The materials should emphasize (for both teachers and students) that science is a process of finding answers to questions. There is a subtle difference between stating a question to suggest its answer (e.g., "To see if it is warmer in the sun or in the shade") and stating it as a problem to investigate (e.g., "To see if there are differences in the temperature of different parts of the environment, and to try to find out why if there are").

3. RECORDING DATA Questions of science are answerable through observation and collection of data pertinent to the question. Recording of observations is a necessary skill to enable the investigator to recall the observations and discuss and interpret them in view

of the questions. Included here is the collection and transcription of information called for by the question: making sketches, notes, taking pictures, recording sounds, and recording measurements.

4. DISCUSSION AND TREATMENT OF GROUP DATA - COMPARING RESULTS A look at the outcomes of each student's or student group's investigation, and a discussion of why one result may differ from another, should emphasize the dynamics of group discussion and dialog rather than recitation and monolog. Discussion of variability of results should assist students in the identification of variables which may influence outcomes. The ability to express or talk about what was done is the skill involved here, with students operating primarily at the observing, identifying, describing, and comparing levels of cognition. Discussion of individual or group results provides the teacher with an opportunity to assess student understanding of the investigation and to recognize possibilities for further investigation, alternative activities to re-emphasize particular concepts, or review.

5. ORGANIZING DATA The ordering and grouping of recorded information makes it easier to interpret and see relationships. Included in this category are tabulation of data, averaging or deciding on best estimates, any visual representation such as line or bar graphs, and pictures or schematic representations. This is the most difficult of the skills directly related to data. For students to become proficient in organizing data often involves the inquiry skill of translating information into a different symbolic form.

6. EXPLAINING, DEFENDING, AND ANSWERING *WHY* QUESTIONS Here discussion is at a more sophisticated level than that previously considered. Explaining should assist in the development of the idea of cause and effect. It implies the students' understanding

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of the question, the procedures, and some ability to interpret results. Defending encourages confidence in one's procedures and interpretation of outcomes. Answering *why* questions requires an understanding of the questions and the tasks and ensures that students will analyze their data and make interpretations. Such questions as "WHERE DID THE HEAT ENERGY COME FROM?" "HOW DO YOU KNOW?" and "WHY ARE YOU TAKING THE TEMPERATURE OF ALL THREE CONTAINERS?" fall into this category. To answer such questions, the students must often operate at the inference level of cognition.

Specific examples of such questions are included in the *Teacher's Manual*. It seems particularly appropriate for the teacher to be asking individuals or groups these kinds of questions as they proceed with an investigation. In preparing the manual we emphasize, by providing questioning strategies, that discussion of this sort with individuals and small groups is an effective method of instruction which provides immediate feedback to the teacher.

7. ASKING QUESTIONS This category refers to student questions which are raised as a result of their observations, experiences, and experimenting. Teachers are given examples of the kinds of questions that students may raise and suggestions of how such questions should be dealt with.

8. IDENTIFYING VARIABLES Identification of those variables which may influence the outcome of an investigation is necessary if one is to understand the concept of a controlled experiment, make any sort of an appraisal of its design, and make an intelligent interpretation of its results. The first step toward these goals is to realize that many factors may influence an outcome, and to recognize and identify some of these factors. Students can learn much by asking about what affected the results. This skill is closely related to predicting.

9. IDENTIFYING CONTROLS Once the students are able to identify variables that may influence an outcome, the idea that all variables except the one under investigation must be held constant can be developed.

10. INTERPRETING RESULTS This is perhaps the most important of the problem-solving skills, and may be the most difficult to develop. Explicit models for teachers and students are provided. They deal with the data collected and interpret it in terms of the question asked. Emphasis is placed on recognizing the limitations of data and that the data may or may not have answered the question; on not going beyond the data; and on recognizing the need for further investigation if the need exists. Teachers are cautioned to avoid the temptation to ignore the data and simply provide "the answer."

11. DRAWING CONCLUSIONS Interpretation of results may warrant drawing conclusions. The emphasis here is on drawing only those conclusions that are supported by the data collected. Some forced conclusions are inevitable because of the difficulty of providing experimental evidence; however, great care is exercised to avoid forced conclusions for experiments that have provided all their own relevant data.

12. RECOGNIZING PROBLEMS AND FORMULATING QUESTIONS This skill is a necessary prerequisite for the general application of the other problem-solving skills outside the classroom situation. In other words, if we expect students to apply the problem-solving skills to their daily problems, it seems necessary that they be able to recognize that a problem exists and to state an appropriate question. To develop this skill, they are engaged and involved with events or phenomena that present an identifiable problem, and are given the opportunity to define that problem.

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13. DESIGNING EXPERIMENTS Once the students are able to recognize a problem and formulate a question, an experiment to answer that question may be designed. The design should include identification of variables and controls, methods for observation, gathering data, organizing and presenting data, and so on. It is assumed that this student population will be able to develop this skill only after a great deal of experience with the preceding ones.

SPECIFYING STRATEGIES FOR INSTRUCTION

The model for inquiry used in these materials specifies without exception a classroom climate in which the teacher is a catalyst and observer, and the students the active center of everything going on. Individually or in small groups the students are engaged in learning with the materials and activities of this program, and the teacher is pivotal in organizing, coordinating, *questioning and eliciting*, and observing - but not in telling. The teacher must be totally conscious of a role in providing the stimulus, while the student is generally unaware that he is being manipulated by strategy. The elicited student behavior may be *attitudinal, cognitive, or psychomotor: verbal or nonverbal*.

To communicate effectively with the teacher, we feel we must carefully describe as much as possible of the *pattern of interaction* upon which the anticipated results depend. The whole intent of this curriculum would be defeated if this pattern is not understood and implemented. We know, for example, that teachers often do not provide children the opportunity or the time to think for themselves when a problem is posed. They also frequently impose their experience, observations, and interpretations on children rather than allow the children to express *their own* views of things observed. We hope, therefore, to provide for teachers a model of strategy in these materials that will - if initially studied and used - demonstrate the benefits we describe for it in terms of student response and learning behavior.

We do *not* anticipate that we can predict all that will occur with individual students in the classroom. We hope that we can, however, provide enough reminders to help the teacher deal with unexpected or unpredicted events in the same mode in which the materials are written.

LEVELS OF GOALS AND OBJECTIVES

Unit Goals

Unit goals are broad general statements that define long-term goals of a major portion of the unit. An initial statement, "The student will," is understood in each of the goals. They are defined as statements that capture the intent and emphasis of the curriculum. They also serve the function of organizers toward which the core objectives are directed.

Core Objectives

The core objectives (stated in student behaviors) refer to the desired outcomes for sequences of activities. The role of these objectives is to summarize what the student will be able to do as a consequence of each of the activity sequences. The core objectives provide a cognitive map for the teacher to extend or elaborate on. These core objectives may also serve as evaluative guides to assess short-term progress and attainment of students.

Activity Objectives

Activity objectives are enabling or performance objectives that relate to the specific activity. Such objectives appear at both the beginning and the end of each activity. They identify the actions to be taken and the behaviors to be acquired by students to insure their success in achieving the broader objectives of the curriculum.

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The role of the activity objective is to provide the teacher with specific instructional landmarks both to plot the course and to chart student progress. The objectives include information which the student has repeated or restated, experiences he has had, actions he has performed, and products he has made. Particular note should be paid to the minimum objectives as stated at the conclusion of the activity. The successful accomplishment of the succeeding activities is largely dependent on each student meeting these stated minimums. Some care should, therefore, be taken in making sure that the minimums are met before moving on to the next activity.

Anticipated Student Response Behaviors

Within an activity the anticipated behaviors are all the actions or interactions occurring during instruction. As listed for each activity, they describe what we predict students will do or say in response to some specific strategy.

TEACHING THE MATERIALS

It is often said that man is a curious animal and that the process and knowledge of science is a vehicle to capitalize on this phenomenon.

Science, then, for the EMH student, capitalizes on the student's natural curiosity about himself. Science is exciting, and ME AND MY ENVIRONMENT relies on this excitement. This science program has been designed to fit into the already existing curriculum framework and within modern teaching philosophies.

The amount of time spent on each activity can be tailored to fit the mood of the class and its teacher - that is, of you and your students. An average of 45 minutes may be required for all activities. Some activities will require extensive time, perhaps several days. The main point in teaching ME AND MY ENVIRONMENT is not to hurry - to allow sufficient time for inquiry to occur.

Me and my Environment

The ME AND MY ENVIRONMENT sequence may span three years, or it may take less time. Make all the allowances you need to for your students, in setting the pace from activity to activity.

Particular attention has been given to articulating the science curriculum with the other parts of the instructional program. Sight vocabulary is included in many of the activities, and suggestions given for using these words in spelling and vocabulary lessons. Math skills are an integral part of science, and the lessons provide application of the student's math skills.

Planning Guide

A planning guide is included in the introductory material to each core. Teaching the materials for the first time will require preparation time. Less time will be required after that. The teacher's planning guide will help you prepare materials in advance. For example, if a film is to be ordered, the planning guide will remind you when. The guide should be followed closely to initiate an activity.

Overviews

Each unit and core of ME AND MY ENVIRONMENT is provided with a beginning "roadmap" to give you as the teacher an insight into the direction or groupings of activities.

Rationale

Each unit and core is provided with a section to provide background into the *why* of the particular teaching content and physical materials used. These rationales should be read, thought about, and continually referred back to, in order for you to focus on and subsequently provide a consistent *why* philosophy in interractions with students.

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Background Information

Some pertinent points which are not necessarily developed in the curriculum itself, but which will provide you with useful information, have been incorporated in the Background Information section at the beginning of each core.

Clues To Success

A portion of the evaluation program during the field testing of ME AND MY ENVIRONMENT involved the use of objective questions and performance tasks. The items used were specifically designed to secure information about students' background knowledge as well as to secure data about the success of the materials. They were not intended as tests, nor were they used in that way to evaluate the youngsters.

Because the design of these items proved highly effective with this student population, many of the questions and situational tasks were incorporated into the second experimental edition. Further refinement was made, and it has resulted in the inclusion throughout this commercial edition of activities titled Clues To Success. These along with their tallysheets give you immediate feedback on the effectiveness of materials and instruction. At the point of use of each of these activities, you have the unique opportunity to determine whether or not your students are ready for the next activity or whether a modification, repetition, extension, or review of certain activities is necessary before proceeding.

Further discussion of the uses of the Clues To Success are included in the expendable section of this introduction entitled Student Record of Progress.

Worksheets

The worksheets in the program are used in a variety of ways: a) as reinforcement to general or specific objectives; b) to introduce new information and to record data; c) to enhance the interest in an activity; d) as a culminating activity to review what has been covered in previous lessons. Difficult worksheets are duplicated on daylight slides (which may be projected on the chalkboard and written on there, during discussions). Worksheets may be introduced on the chalkboard before they are attempted by the individual students.

35 mm Slides

A colorful visual medium broadens instructional opportunities, especially during inquiry activities. The projected images of the slides should be used both by you and by most students during instruction. The teaching strategies give specific instructions.

Some of the slides, as noted, are duplications of various worksheets. They are specially processed for daylight projection: you need not completely darken your classroom. Students should be able to write or read at their desks or move from their desks to the chalkboard to write directly on the image with chalk while a slide is being shown. You should, however, turn off any lights or shade any windows whose light is reflected directly from the chalkboard. For adequate projection, use a 500-watt bulb.

For other slides, which are photographic scenes and for which there is no necessity to write on the projected image darken your classroom. These slides should be projected on a regular screen.

The largest possible image is usually best for the students to see clearly. Therefore, place the slide projector as far as possible from the chalkboard or screen, but not so far that the image projected extends above or below the edges of the board or screen.

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Be sure that you are familiar with the operating instructions for the Carousel Projector and that you observe the manufacturer's cautions for insertion and projection of slides, trays, bulbs, and lenses.

Filmstrips

For activities in which an entire series of slides will be used to promote one objective, a filmstrip has been made. If a Kodak Carousel* or Ektagraphic projector is the type to be used for the projection of the slides, we recommend the purchase of the Kodak Ektagraphic Filmstrip Adapter. It is inexpensive and will preclude the use of a second projector.

Games

Perhaps the most ambitious of the endeavors has been to promote certain objectives through the use of games and game theory. Besides providing variation to the instructional mode, the games are used to dramatize some of the major concepts in the curriculum, as well as to give experience in cooperation and taking turns.

Booklets

This medium is used as a variation to the worksheets and 35 mm slides. It combines a minimum of reading with cartooned illustrations to present somewhat detailed factual information.

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*Except the Kodak Carousel Sand S and S-AV projectors. The optional systems are not compatible.

Posters

When something is referred to often enough, it is sometimes advisable to present it in a large format. In these instances a 24" X 36" poster has been developed for convenient posting and frequent inspection.

Study Cards

Thirty-two photographic study cards have been prepared to provide further variation in the mode of presentation. They are designed for use with specific activities and to form the nucleus for a collection of photographs for bulletin board displays.

Polaroid Camera

To increase the opportunities for involving all students in the activities, a Polaroid camera is suggested as an optional part of the instructional materials. An activity designed to introduce your students to this camera is included as the first Change Of Pacer in the back of this *Teacher's Manual*. The camera was provided through the courtesy of the Polaroid Corporation during the field testing, but it cannot be supplied on this basis in quantity.

In most instances, in the field tests, the camera in the classroom served as a valuable motivational device for the students, as well as a help in prolonging their ever-so-short interest spans. Because of these successes, a Polaroid camera is strongly recommended. It has not been included as an integral portion of the basic kit, because of the potential cost of film and flashcubes.

Camera Log Book

An excellent means of recording and preserving class activities and student experiences is through the development of a class log book. To keep a
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book. To keep a log book, either make or purchase a photo album. Students may share the responsibility of collecting and mounting snapshots, titling each cluster of pictures, and writing a descriptive sentence or short poem to recollect what occurred in a particular picture.

The log book helps to build student ego and class morale. Students can browse through it periodically to recall what they looked like and what they accomplished alone and with other students in previous months. The teacher may use it as a change of pacer to help students recall and review specific concepts and activities, and to provide practice in written and verbal communication skills.

Change Of Pacers

At the back of this *Teacher's Manual* you will find the section called Change Of Pacers. There, numerous examples and suggestions are offered for those days when it is difficult to adhere to your regular schedule. These probably include days just prior to or immediately following a vacation, other days during the occurrence of severe snow storms or cold weather, and periods of high absenteeism due to epidemics, assembly programs, and so forth. So that these days will not be wasted, we have suggested a variety of enrichments, reviews, or extensions that complement and add to this curriculum. Use these activities, then, as the name implies, to provide those refreshing breathers to give your program the added zip that is necessary to offset those occurrences in scheduling over which you have no control.

Student Folders

A set of decals has been included with your *Teacher's Manual*. These are to be placed on the cover of a three ring binder or folder in which your students will keep their worksheets as they are completed. Reference is often made to worksheets already completed, and they are necessary at various points in the program. The folder provides you and the students with an efficient and convenient mechanism for maintaining their own files of science activities.

Team Size And Science Materials

The quantities of materials provided in the kit are based on a class size of sixteen students, or four teams of four each, or eight teams of two each. In the case of smaller numbers of students, you may find it advantageous to reduce the number of students working in a team. Likewise, in cases of larger numbers of students, the teams should be enlarged, or additional materials ordered.

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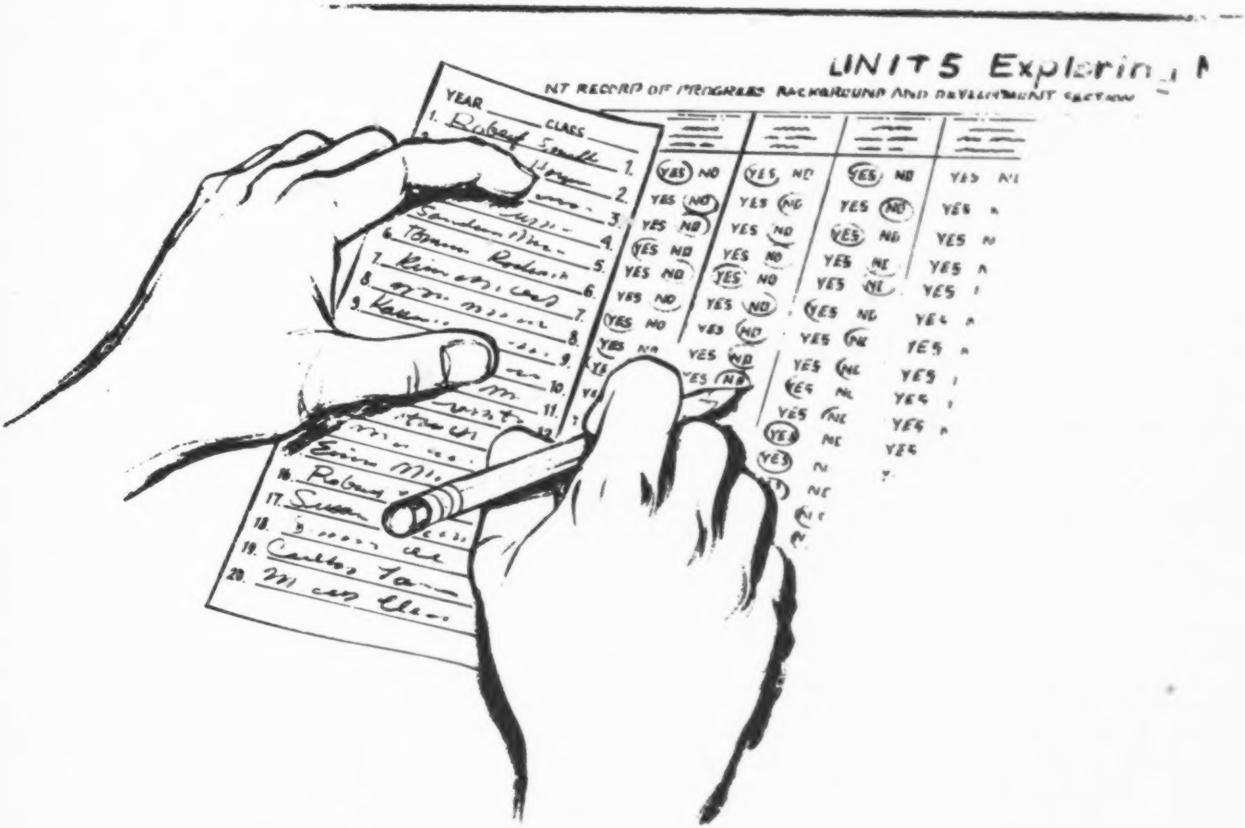
DIRECTIONS FO

DIRECTIONS FOR USING THE STUDENT RECORD OF PROGRESS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UNIT V
STUDENT RECORD OF PROGRESS
INTRODUCTION

USES OF RECORD

Throughout each unit of ME AND MY ENVIRONMENT are Clues to Success activities which provide immediate feedback on the effectiveness of the materials and instruction. The Student Record of Progress helps you organize this information. This record will allow you to judge the effectiveness of instruction for your class at many points in the curriculum. It will also allow you to monitor the individual progress of students and set different standards of success for different children.

The Clues to Success activities and this Record are not intended for use as a grading system. Use it to make decisions, repeat or extend instruction, or to decide when to move on to the next activity. Use it to decide how to divide the class into teams for specific activities, and to assure the success of every student.

The two most important functions of the Student Record of Progress are:

1. To assess background and understanding: It rejects the notion that a single measure, like an IQ test, can tell what a child is able to do for all time. Instead, it enables the teacher to identify the level of skills and understandings related to each core of activities.

2. To assure success: It rejects the idea of sorting children into those who know or can do and those who can't. Instead, it provides a way for the teacher to direct his or her efforts toward the students needing greatest support in specific skills or concepts, so those students can achieve success.

The Student Record of Progress contains five main sections: Background and Development, Understanding, Participation, Summary of Progress, and Tallysheets for the Clues to Success activities.

BACKGROUND AND DEVELOPME

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UNIT V
STUDENT RECORD OF PROGRESS
INTRODUCTION

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BACKGROUND AND DEVELOPMENT SECTION

A child's success on each core of activities is dependent on his background of experiences with those particular concepts. Some basic skills are also central to success with these materials, especially problem-solving skills, the ability to recognize what the question is and what might lead to an answer. Following directions, working with one's hands, and categorizing are also important skills. You will find that some students will be weak in some areas but quite good in others. As the materials demand specific skills, assessments are provided to identify students who are low in these areas and will need extra attention and support to achieve success. This section provides a means of recording these assessments to develop a profile for each student.

The assessments of Background can be thought of as pretests measuring where your students are when instruction in certain areas is introduced. The results will suggest what responses are reasonable to expect when you teach the materials. If a student who is less able in those skills is teamed with a more able student, he might be more successful and less frustrated in doing the activities.

No student is uniformly low (or high) in all skills and experiences. Some go through spurts of development. Background assessments help avoid prejudging children. They serve to correct underestimates and overestimates of initial competencies and experience. Assessments of the most important background and developmental skills are periodically interspersed throughout the materials. The Overview page following this introduction indicates which skills are assessed at various points in the year.

Progress in Following Directions is the first record page in the Background and Development Section. Ability to follow directions is essential for maximum success on activities and for building a personal sense of competence in and control over one's environment. Identify those students in need of special help and follow their progress.

BACKGROUND AND DEVELOPMENT SECTION (continued)

At four points in Unit V you are asked to rate your student's ability to follow directions. Clues to Success activities at these points provide an objective measure of students' abilities. Combining these two sources of information should reveal which students need closest supervision and support in order to achieve success.

Development in Reasoning is the second record in this section. The skills on this page are closely related to some of the higher inquiry skills. Because of a lack of experiences and a different rate of maturation, some children will be several developmental steps away from the ability to think abstractly or to reason logically and systematically. The materials are designed to support the development of these abilities, by providing as many concrete, "doing" activities as possible. Such abilities cannot be directly taught, however. They are developmental and require months and many experiences to achieve.

The developmental skills that receive special emphasis in Unit V are the grouping and classifying things and the conservation of quantity. A child who can conserve understands that the quantity of something remains the same (is conserved) when its shape is changed (broken into pieces or placed in a different container). If students lack these skills, they may not be able to imagine a situation and think through various outcomes "in their head." They need to work with concrete objects and have many experiences to develop the ability to reason logically and in abstract terms.

Development of Experience is the third record page in the Background and Development Section. The fundamental inquiry skills of observing and describing which are basic to many activities throughout this curriculum are the focus of this part of the Student Record of Progress. As students develop the ability to concentrate

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UNDERSTANDING SECTION

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UNIT V
STUDENT RECORD OF PROGRESS
INTRODUCTION (continued)

BSCS

on a task and recognize salient details, and as they aquire a vocabulary of descriptive terms, they will experience greater success with the science materials. Such skills are also a useful complement to other vocational skills for success in the world of work.

UNDERSTANDING SECTION

A sense of progress and achievement is something students need help to realize. This record is one way you can show students they are learning. A log of student performance also lets you see the progress of the class as well as of individual students. To help identify strengths and weaknesses of groups in the class, tallysheets are included for some Clues to Success activities. These tallysheets can be found at the end of the Student Record of Progress.

Several aspects of accountability are provided by this section. First, and most important, the teacher has an accounting of his or her own effectiveness in instruction. Over a period of time there should be fewer students who are unsuccessful. Should many in the class show a consistent lack of success, it may be that these materials are inappropriate for that particular group of students. This log of student performance can also provide evidence of learning and progress to parents and the school. Finally, the Summary of Progress Section may reveal students who are inappropriately placed. It certainly should provide additional information to consider in any review of the placement of students in special education classes.

PARTICIPATION

The four major aims of ME AND MY ENVIRONMENT involve far more than the learning of specific information and skills. They include the development of a sense of self-worth, successful behaviors for daily life, attitudes, relationships with others, and the ability to assume various responsibilities. This section of the Student Record of Progress provides a means of following and encouraging the development of some of these behaviors.

PARTICIPATION (continued)

Responsibility and Involvement is the first record page in this section. Students need many opportunities to assume responsibility and to carry things out on their own. Of course this is tremendously important in every day experiences. Use this page as a planning guide to see that each child gets the chance to do such things as care for plants and animals, set up and operate audio-visual equipment, distribute and clean up science equipment, prepare bulletin boards, etc. Use this section also to note students who have difficulty following through on responsibilities. Plan additional opportunities for these children (not as penalties) and provide the support needed for them to successfully accomplish their task.

Sometimes students' attitudes and involvement shift during the year. You may not be conscious of the shift without purposely reviewing students' actions. As a major aim of the curriculum is to develop certain attitudes and interests, it is useful to consider this dimension several times during the year. To assist you in this review, the page provides space to record ratings of student attitudes and participation.

Cooperation and Perserverance is the second page of this section. Closely related to the assumption of responsibilities and involvement in activities is the day-to-day participation of students. Sometimes personal behavior problems prevent success or interfere with the work of the class. A page in the Accomplishments Section is provided to record cooperative social behavior and completion of daily work in science. Students often need help to recognize problems which interfere with their learning. It is sometimes effective to have students who are encountering difficulties assist in rating their own daily performance.

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SUMMARY OF PROGRESS

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TALLYSHEET SECTION

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USE OF CLASS LIST

On page 26 you wil
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your student's names mo

Students also need recognition and praise for showing initiative, perserverance, or extra effort. This record may be used to identify those students who have put forth extra effort or have been involved in activities. Such behavior should be reinforced by the teacher.

SUMMARY OF PROGRESS

In order to obtain a comprehensive view of each child's progress, a system has been developed for comparing results from one point in time to another and across all of the records of skills and understandings. Steps to apply this system are described in the last activity in the unit.

TALLYSHEET SECTION

When reference is made in a Clues to Success activity to the use of a tallysheet, find the appropriate one in the last section of the Student Record of Progress. The tallysheets contain guidelines for scoring and interpreting student work. They organize the results in a convenient way for revealing strengths and weaknesses in understanding for the class as a group. They also simplify recording results in the Student Record of Progress

USE OF CLASS LIST

On page 26 you will find a Class List card for use in making entries in the Student Record of Progress. This card eliminates the need to list your student's names more than once.

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STUDENT RECORD OF PROGRESS

UNIT V OVERVIEW

	Pages of Record when results are recorded	Background, Understandings, and Participation Samples	CORE A Act. 5-0 - 5-6	CORE B 5-7 - 5-10	CORE C 5-11 -
BACKGROUND AND DEVELOPMENT SECTION	Progress in Following Directions	Following Directions	5-0 5-2	5-10	
	Development in Reasoning	Conservation	Test 5-2		
		Grouping	5-0 5-5		
	Development of Experience	Orientation in Space	5-0	5-10	
		Observing	5-0		
		Describing		5-10	
UNDERSTANDING SECTION	Numbers and Measurements	Using a Balance	5-0 5-3	5-10	
		Calculations	5-3 5-6		
		Reading a Graph			
		Measurements	5-0		
	Concepts	Concepts		5-10	
	Problem-Solving	Knowing the Question What Varies Outcomes (Results and Implications)			
PARTICIPATION SECTION	Responsibility and Involvement	Involvement		5-10	
		Responsibilities	WEEKLY RECORD		
	Cooperation and Perseverance	Social Behavior	RECORD FOR EACH ACTIVITY		
		Task Behavior	RECORD FOR EACH ACTIVITY		

STUDENT RECORD OF PROGRESS

UNIT V OVERVIEW

	CORE A Act. 5-0 - 5-6	CORE B 5-7 - 5-10	CORE C 5-11 - 5-16	CORE D 5-17 - 5-21	CORE E 5-22 - 5-26	CORE F 5-27 - 5-29	CORE G 5-30 - 5-35
	5-0 5-2	5-10			5-26		5-34
	Test 5-2 5-0 5-5						5-31
	5-0 5-0	5-10 5-10					5-31
	5-0 5-3 5-3 5-6 5-0	5-10		5-21 5-21			5-34
		5-10	5-16	5-21	5-26	5-27	5-34 5-35
ns)				5-21 5-21 5-21 5-21			5-34 5-34
	WEEKLY RECORD	5-10		5-21			5-34 5-35
	RECORD FOR EACH ACTIVITY RECORD FOR EACH ACTIVITY		5-16				

UNIT V
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
PROGRESS IN FOLLOWING DIRECTIONS

Teacher Rating:

Prior to each activity assessing the ability to follow directions, rate each child's ability to follow directions by circling a number from 0 to 5. The higher the number circled, the more able you believe the child is to carry out a task or sequence of activities with little supervision. For Activity 5-26, circle the number of directions which you feel each child will be able to follow.

Activity Scores:

Follow the guidelines in the Clues to Success Activities 5-2, 5-10, 5-26, and 5-34 to obtain a "following directions" score for each student. Combine your rating with this score to determine who needs help most. Provide close supervision and support to help these students be successful. Team them with more able students. Plan special opportunities for them to practice following directions.

STUDENT NUMBER	TCHR. RATING START OF ACT. 5-0 LOW HIGH	ACT. 5-0 5-0A WORKSHEET SCORE	TCHR. RATING START OF ACT. 5-2 LOW HIGH	ACT. SCOR
1.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
2.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
3.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
4.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
5.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
6.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
7.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
8.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
9.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
10.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
11.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
12.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
13.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
14.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
15.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
16.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
17.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
18.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
19.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2
20.	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2

Teacher________________________________
Year___________________________________

UNIT V
STUDENT RECORD OF PROGRESS
ACKGROUND AND DEVELOPMENT SECTION
PROGRESS IN FOLLOWING DIRECTIONS

RATING T OF 5-0 HIGH	ACT. 5-0 5-0A WORKSHEET SCORE	TCHR. RATING START OF ACT. 5-2 LOW HIGH	ACT. 5-2 SCORE	WHO NEEDS HELP MOST?	TCHR. RATING START OF ACT. 5-10 LOW HIGH	ACT. 5-10 SCORE YES PART NO	WHO NEEDS HELP MOST?
4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	______	0 1 2 3 4 5	0 1 2 3 4 5	______
4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	______	0 1 2 3 4 5	0 1 2 3 4 5	______
4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	______	0 1 2 3 4 5	0 1 2 3 4 5	______
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4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	______	0 1 2 3 4 5	0 1 2 3 4 5	______
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UNIT V
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
PROGRESS IN FOLLOWING DIRECTIONS (continued)

STUDENT NUMBER	TCHR. RATING START OF ACT. 5-26	ACT. 5-26 SCORE	WHO NEEDS HELP MOST?	TCHR. RATING START OF ACT. 5-34 LOW HIGH	ACT. 5 SCO YES
1.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
2.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
3.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
4.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
5.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
6.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
7.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
8.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
9.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
10.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
11.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
12.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
13.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
14.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
15.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
16.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
17.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
18.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
19.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES
20.	0 1 2 3	0 1 2 3	_____	0 1 2 3 4 5	YES

Teacher________________________
Year________________________

UNIT V
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
OGRESS IN FOLLOWING DIRECTIONS (continued)

ACT. 5-26 SCORE	WHO NEEDS HELP MOST?	TCHR. RATING START OF ACT. 5-34 LOW HIGH	ACT. 5-34 SCORE YES NO	STUDENT PROGRESS IN UNIT V HIGH GROWTH LOW
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
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0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____
0 1 2 3	____	0 1 2 3 4 5	YES NO	____ ____ ____

UNIT V
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
DEVELOPMENT IN REASONING

Setting Standards For Success:

Those students who are successful with tasks recorded on this page are likely to be able to reason abstractly; they can think things through in their heads.

Those who are relatively unsuccessful with these tasks may still be responding intuitively rather than logically. They will need to try things out physically with real objects. Much manipulation and doing is appropriate.

Remember that the brief sample of behavior recorded on these pages never totally describes a student. This record does provide enough information to set criteria for success. Those who cannot group and conserve are probably unable to generalize, interpret and synthesize information.

STUDENT NUMBER	CD/PS QUESTION BOOKLET - SPRING 1973					ACTIVITY 5-0		A
	Conserving	Problem Solving	Abstract Thinking	Who Can Help Others?	Who Needs Help Most?	Grouping	Who Needs Help Most?	Co
1.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
2.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
3.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
4.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
5.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
6.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
7.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
8.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
9.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
10.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
11.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
12.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
13.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
14.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
15.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
16.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
17.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
18.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
19.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
20.	YES NO	YES NO	YES NO			HIGH SOME LOW		Y
	NOTES:					NOTES:		N

Teacher ______________________________
Year ________________________________

UNIT V
STUDENT RECORD OF PROGRESS
ACKGROUND AND DEVELOPMENT SECTION
DEVELOPMENT IN REASONING

LET - SPRING 1973			ACTIVITY 5-0		ACT. 5-2		ACTIVITY 5-5		ACT. 5-31	
tract nking	Who Can Help Others?	Who Needs Help Most?	Grouping	Who Needs Help Most?	Conservation	Who Needs Help Most?	Grouping	Who Needs Help Most?	Grouping	Student Progress In Unit V
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
S NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
NO	____	____	HIGH SOME LOW	____	YES NO	____	HIGH SOME LOW	____	YES NO	HIGH GROWTH LOW
			NOTES:		NOTES:		NOTES:		NOTES:	

UNIT V
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
DEVELOPMENT OF EXPERIENCE

Surveying Awareness:

Some of your students will be quite alert to details and changes in their environment. They will recognize subtleties in what goes on around them and be able to see below the surface of things. They may be quite worldly and wise to the ways of the streets.

Other students may seem lethargic and unobserving. They may simply take things at face value and be quite gullible.

This difference in awareness calls for different expectations and standards of performance.

Abilities to observe and describe can be taught. You should note development of these skills over the course of this unit.

	ACT. 5-0	ACT. 5-0	ACT. 5-0		ACTIVITY 5-0	ACT. 5
	Left-Right	Compass Directions	Intersections	Who Needs Help Most?	Observation	Orient- tion In Spa
1.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
2.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
3.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
4.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
5.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
6.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
7.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
8.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
9.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
10.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
11.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
12.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
13.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
14.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
15.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
16.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
17.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
18.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
19.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N
20.	YES NO	YES NO	HIGH LOW		HIGH SOME LOW	YES N

Teacher__________________________
Year_____________________________

UNIT V
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
DEVELOPMENT OF EXPERIENCE

ACT. 5-0		ACTIVITY 5-0	ACT. 5-10	ACTIVITY 5-10	ACT. 5-31	ACTIVITY 5-31	
Inter-sections	Who Needs Help Most?	Observation	Orientation In Space	Descriptions	Order	Describe	Student Progress In Unit V
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW
HIGH LOW		HIGH SOME LOW	YES NO	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH GROWTH LOW

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
NUMBERS AND MEASUREMENTS

The Numbers and Measurements page provides an opportunity to record a student's knowledge of facts and skills basic to the activities of this unit. Students who lack this background may have difficulty and need extra attention.

Students should show growth in these skills throughout the unit. It may be necessary to extend instruction into other subject areas to further develop or reinforce these understandings.

Share this information with other subject area teachers as appropriate to your teaching situation.

STUDENT NUMBER	ACTIVITY 5-0			Who Needs Help Most?	ACTIVITY 5-3		Who Needs Help Most?	ACT. 5-6	AC 5-
	Temp.	Length	Weight		Weighing	Weight Loss		Totals	Usi A Balanc
1.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
2.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
3.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
4.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
5.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
6.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
7.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
8.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
9.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
10.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
11.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
12.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
13.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
14.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
15.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
16.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
17.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
18.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
19.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE
20.	YES NO	YES NO	YES NO	____	YES NO	YES NO	____	YES NO	YE

Teacher________________________
Year___________________________

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
NUMBERS AND MEASUREMENTS

	ACTIVITY 5-3			ACT. 5-6	ACT. 5-10		ACTIVITY 5-21 USING A GRAPH		ACTIVITY 5-34		
Who Needs Help Most?	Weighing	Weight Loss	Who Needs Help Most?	Totals	Using A Balance	Who Needs Help Most?	Number	Date	Reading A Graph	Translating Data	Student Progress In Unit V HIGH GROWTH LOW
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	
	YES NO	YES NO		YES NO	YES NO		YES NO	YES NO	YES NO	YES NO	

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS

This record reveals as much about your instruction as it does about your students understanding of these concepts. If you note that the same students have difficulty grouping ideas throughout the unit, aim your instruction at them. This could result in all achieving success.

This record also provides an indication of retention of ideas over a larger period of time.

	ACTIVITY 5-10				ACT. 5-16	ACTIVI
STUDENT NUMBER	Water In Plants	Water Use	Water Treatment	Core B Concepts Who Is:	Water Cycle	Pollution
1.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
2.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
3.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
4.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
5.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
6.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
7.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
8.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
9.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
10.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
11.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
12.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
13.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
14.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
15.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
16.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
17.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
18.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
19.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO
20.	YES NO	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	YES NO

Teacher____________________________

Year____________________________

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS

		ACT. 5-16	ACTIVITY 5-21			ACTIVITY 5-26			
ter eat-ent	Core B Concepts Who Is:	Water Cycle	Pollution	Water Conservation	Core D Concepts Who Is:	Carbon Dioxide	Oxygen	Interdependence	Control
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO
NO	HIGH LOW	HIGH SOME LOW	YES NO	HIGH SOME LOW	HIGH LOW	YES NO	YES NO	YES NO	YES NO

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS (continued)

STUDENT NUMBER	CORE E CONCEPTS	ACT. 5-27	ACTIVITY 5-34				ACTIVIT
	Who Is:	Pressure	Fumes Dangerous To Living Things	Fumes Dangerous To Man	Water Content	Water Use	Saving Water
1.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
2.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
3.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
4.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
5.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
6.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
7.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
8.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
9.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
10.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
11.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
12.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
13.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
14.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
15.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
16.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
17.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
18.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
19.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N
20.	HIGH LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES N

Teacher______________________________
Year______________________________

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS (continued)

Y 5-34	ACTIVITY 5-35 CONCEPT REVIEW QUESTIONS						
Fumes Dangerous To Man	Water Content	Water Use	Saving Water	Water Source	Water Treatment	Water Cycle	Fate Of The River
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW
YES NO	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	HIGH SOME LOW	HIGH SOME LOW

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS(continued)

STUDENT NUMBER	ACTIVITY 5-35 CONCEPT REVIEW QUESTIONS							CORE G CONC
	Population And Water	Oxygen	Oxygen And Carbon Dioxide	Air And Weather	Wind And Water	Things In Air	Air Pollution	Who Is:
1.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
2.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
3.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
4.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
5.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
6.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
7.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
8.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
9.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
10.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
11.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
12.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
13.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
14.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
15.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
16.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
17.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
18.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
19.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW
20.	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	HIGH LOW

Teacher________________________
Year___________________________

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS(continued)

EW QUESTIONS			CORE C	CONCEPTS	STUDENT PROGRESS				
Wind And Water	Things In Air	Air Pollution	Who	Is:	IN UNIT V				
					HIGH	GROWTH	LOSS	LOW	NOTES
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					
YES NO	YES NO	YES NO	HIGH	LOW					

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
PROBLEM SOLVING

This page of the Student Record of Progress provides the opportunity to record information regarding a student's ability to engage in problem-solving behaviors. Problem-solving, like reasoning, is one of the higher inquiry skills which requires both time and a variety of experience to develop.

The activities upon which this page is based require the student to be able to identify the question, set up an experiment, identify and control variables, and predict outcomes. Each of these is a difficult task.

Many students will not have been expected to engage in problem-solving in the past. Therefore, their limited background will, likewise, limit their present performance.

As with each of the other skills and abilities which you are attempting to develop, the development of problem-solving will require giving students many experiences with manipulating experiments and data.

	ACTIVITY 5-21				
	Knowing The Question	What Varies	Outcomes	Who Needs Help Most?	Con Va
1.	YES NO	YES NO	HIGH SOME LOW	______	Y
2.	YES NO	YES NO	HIGH SOME LOW	______	Y
3.	YES NO	YES NO	HIGH SOME LOW	______	Y
4.	YES NO	YES NO	HIGH SOME LOW	______	Y
5.	YES NO	YES NO	HIGH SOME LOW	______	Y
6.	YES NO	YES NO	HIGH SOME LOW	______	Y
7.	YES NO	YES NO	HIGH SOME LOW	______	Y
8.	YES NO	YES NO	HIGH SOME LOW	______	Y
9.	YES NO	YES NO	HIGH SOME LOW	______	Y
10.	YES NO	YES NO	HIGH SOME LOW	______	Y
11.	YES NO	YES NO	HIGH SOME LOW	______	Y
12.	YES NO	YES NO	HIGH SOME LOW	______	Y
13.	YES NO	YES NO	HIGH SOME LOW	______	Y
14.	YES NO	YES NO	HIGH SOME LOW	______	Y
15.	YES NO	YES NO	HIGH SOME LOW	______	Y
16.	YES NO	YES NO	HIGH SOME LOW	______	Y
17.	YES NO	YES NO	HIGH SOME LOW	______	Y
18.	YES NO	YES NO	HIGH SOME LOW	______	Y
19.	YES NO	YES NO	HIGH SOME LOW	______	Y
20.	YES NO	YES NO	HIGH SOME LOW	______	Y

Teacher__________________________
Year____________________________

UNIT V
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
PROBLEM SOLVING

ACTIVITY 5-21				ACTIVITY 5-34		
n	What Varies	Outcomes	Who Needs Help Most?	Controlling Variables	Setting Up An Experiment	Student Progress In Unit V HIGH SOME LOW
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	
	YES NO	HIGH SOME LOW		YES NO	YES NO	

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
RESPONSIBILITY AND INVOLVEMENT

ASSIGNMENT OF RESPONSIBILITIES

Many tasks should be shared by students. Use this log to assign responsibilities by the week (or other time period). Some tasks and codes for them are listed; add others of your own:

AV--set up and operate audio-visual equipment (projector, recorder, etc.)
P --care for plants
A --care for animal pet
T --care for terraria plants and animals
F --care for fish and pond
E --get out, clean, and put away science equipment
BB--prepare bulletin board
--______________________________
--______________________________
--______________________________

Enough space is provided to enter a date for a second chance to do various tasks as time permits. There is also enough space to record whether the student completed the task:

O = on his own without reminders or assistance
R = on his own after reminding
H = with someone's help

RATING OF INVOLVEMENT

At four points in the course of Unit V, rate each student's involvement and interest in science activities by circling a number from 0 to 5 in the appropriate column. Rate students 0 if they are completely uninterested or apathetic; rate them 5 if they are extremely excited and involved in doing things in science.

STUDENT NUMBER	TASK	AV	P	A	T	F
1.	DATE & SUCCESS					
2.	DATE & SUCCESS					
3.	DATE & SUCCESS					
4.	DATE & SUCCESS					
5.	DATE & SUCCESS					
6.	DATE & SUCCESS					
7.	DATE & SUCCESS					
8.	DATE & SUCCESS					
9.	DATE & SUCCESS					
10.	DATE & SUCCESS					
11.	DATE & SUCCESS					
12.	DATE & SUCCESS					
13.	DATE & SUCCESS					
14.	DATE & SUCCESS					
15.	DATE & SUCCESS					
16.	DATE & SUCCESS					
17.	DATE & SUCCESS					
18.	DATE & SUCCESS					
19.	DATE & SUCCESS					
20.	DATE & SUCCESS					

Teacher________________________________

Year________________________________

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
RESPONSIBILITY AND INVOLVEMENT

	ASSIGNMENT OF RESPONSIBILITIES												
STUDENT NUMBER	TASK	AV	P	A	T	F	E	BB	___	___	___	___	___
1.	DATE &												
	SUCCESS												
2.	DATE &												
	SUCCESS												
3.	DATE &												
	SUCCESS												
4.	DATE &												
	SUCCESS												
5.	DATE &												
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6.	DATE &												
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15.	DATE &												
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16.	DATE &												
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18.	DATE &												
	SUCCESS												
19.	DATE &												
	SUCCESS												
20.	DATE &												
	SUCCESS												

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
RESPONSIBILITY AND INVOLVEMENT (continued)

STUDENT NUMBER		RATING OF INVOLVEMENT				STUD
		AFTER ACT. 5-10	AFTER ACT. 5-21	AFTER ACT. 5-34	AFTER ACT. 5-35	HIGH RESP. INVOLV.
1.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
2.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
3.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
4.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
5.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
6.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
7.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
8.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
9.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
10.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
11.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
12.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
13.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
14.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
15.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
16.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
17.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
18.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
19.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	
20.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5	

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
SPONSIBILITY AND INVOLVEMENT (continued)

Teacher____________________

Year____________________

RATING OF INVOLVEMENT			STUDENT PROGRESS IN UNIT V		
AFTER ACT. 5-21	AFTER ACT. 5-34	AFTER ACT. 5-35	HIGH RESP. INVOLV.	ADEQUATE RESP. INVOLV.	LOW RESP. INVOLV.
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5			

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
COOPERATION AND PERSEVERANCE

A record sometimes helps clarify persistent learning problems. Sometimes students can gain in self-awareness by assisting in recording their own daily performance. In this way they become aware of the frequency with which problems occur.

To make an entry in the record, simply make a minus or plus mark (-, +) to indicate a problem or positive behavior. Much white space (lack of entries) for a student would denote generally good social and task-related behaviors.

Two columns under each activity allow you to record several types of behavior. For either category, you should decide on the items of behavior to include. If some of the behaviors below are appropriate, check them off, or write in your own.

S --Social behavior might include:
- ☐ non cooperation with a team
- ☐ aggressiveness toward others
- ☐ nonparticipation
- ☐ outbursts

T --Task-related behavior might include:
- ☐ not completing the work for an activity
- ☐ forgetting to bring necessary things
- ☐ not carrying out responsibilities
- ☐ doing things not related to the task

Compare this record with the students' success and functional abilities to see if any patterns are apparent. Remember that different relationships may exist for different students.

STUDENT NUMBER	ACTIVITIES					
	1		2		3	
	S	T	S	T	S	T
1.						
2.						
3.						
4.						
5.						
6.						
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19.						
20.						

NOTES:

Teacher________________________________
Year__________________________________

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
COOPERATION AND PERSEVERANCE

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STUDENT NUMBER	ACTIVITIES																									
	1		2		3		4		5		6		7		8		9		10		11		12		13	
	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T
1.																										
2.																										
3.																										
4.																										
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NOTES:

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
COOPERATION AND PERSEVERANCE (continued)

	ACTIVITIES																												
STUDENT	14		15		16		17		18		19		20		21		22		23		24		25		26		27		2
NUMBER	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S
1.																													
2.																													
3.																													
4.																													
5.																													
6.																													
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18.																													
19.																													
20.																													

NOTES:

Teacher ____________________
Year ____________________

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
ATION AND PERSEVERANCE (continued)

21	22		23		24		25		26		27		28		29		30		31		32		33		34		35	
T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T

STUDENT RECORD OF PROGRESS

SUMMARY OF STUDENT PROGRESS IN U

From your summaries of each page, list the students with the LEAST Background, Understanding, and Accomplishments in Unit V. For those whose names appear in many columns, make special plans to insure their future success.

LOW IN BACKGROUND AND DEVELOPMENT			LOW IN UNDERSTANDING		
DIRECTIONS	REASONING	EXPERIENCE	MEASUREMENT	ORIENTATION	CONCE

NOTES:

From your summaries of each page, list the students with the MOST Background, Understanding, and Accomplishments in Unit V. Review their work in other subjects and the appropriateness of their placement in this class.

HIGH IN BACKGROUND AND DEVELOPMENT			HIGH IN UNDERSTANDING		
DIRECTIONS	REASONING	EXPERIENCE	MEASUREMENT	ORIENTATION	CONCE

NOTES:

STUDENT RECORD OF PROGRESS

SUMMARY OF STUDENT PROGRESS IN UNIT V

Teacher____________________

Year____________________

VELOPMENT	LOW IN UNDERSTANDING			LOW IN PARTICIPATION		WHO NEEDS HELP TO SUCCEED IN UNIT V?
XPERIENCE	MEASUREMENT	ORIENTATION	CONCEPTS	RESPONSIBILITY	COOPERATION	

EVELOPMENT	HIGH IN UNDERSTANDING			HIGH IN PARTICIPATION		WHO SHOULD BE REVIEWED FOR PLACEMENT IN REGULAR CLASS?
XPERIENCE	MEASUREMENT	ORIENTATION	CONCEPTS	RESPONSIBILITY	COOPERATION	

TALLYSH
Activity 5-2

Teacher Rating. Prior to this activity, rate each student's ability to follow directions by circling a number from 0 to 5. The higher the number circled, the more able the student is to carry out a task or sequence of activities with little supervision.

Following Directions. Rate each student's ability to follow directions during this activity, allowing one point for each direction outlined in Activity 5-2. Circle the number of directions followed. The higher the number circled, the more able the student is to carry out a task with little supervision.

Student Developmental Level. Both items on Worksheet 5-2 assess the ability to conserve quantity (refer to Activity 5-2). Circle the response for each student for Items 1 and 2. For a student to be considered as having the ability to conserve, he must have answered both items correctly. Circle YES or NO in the "Conserver" column to indicate whether the student can conserve (i.e., answered both questions correctly). Children who are conservers are beginning to develop the ability to think abstractly.

When you have completed rating each student, put group totals in the space provided. This will help you with an overall picture of the class.

	DIRECTIONS PAGE		
	Teacher Rating On Directions	Score On Directions	Co
KEY	5 4 3 2 1 0	5 4 3 2 1 0	A
1.	5 4 3 2 1 0	5 4 3 2 1 0	A
2.	5 4 3 2 1 0	5 4 3 2 1 0	A
3.	5 4 3 2 1 0	5 4 3 2 1 0	A
4.	5 4 3 2 1 0	5 4 3 2 1 0	A
5.	5 4 3 2 1 0	5 4 3 2 1 0	A
6.	5 4 3 2 1 0	5 4 3 2 1 0	A
7.	5 4 3 2 1 0	5 4 3 2 1 0	A
8.	5 4 3 2 1 0	5 4 3 2 1 0	A
9.	5 4 3 2 1 0	5 4 3 2 1 0	A
10.	5 4 3 2 1 0	5 4 3 2 1 0	A
11.	5 4 3 2 1 0	5 4 3 2 1 0	A
12.	5 4 3 2 1 0	5 4 3 2 1 0	A
13.	5 4 3 2 1 0	5 4 3 2 1 0	A
14.	5 4 3 2 1 0	5 4 3 2 1 0	A
15.	5 4 3 2 1 0	5 4 3 2 1 0	A
16.	5 4 3 2 1 0	5 4 3 2 1 0	A
17.	5 4 3 2 1 0	5 4 3 2 1 0	A
18.	5 4 3 2 1 0	5 4 3 2 1 0	A
19.	5 4 3 2 1 0	5 4 3 2 1 0	A
20.	5 4 3 2 1 0	5 4 3 2 1 0	A
TOTALS	_ _ _ _ _ _	_ _ _ _ _ _	_

Does this review give an accura

If not, what other evidence do

Teacher ______________________

TALLYSHEET 5-1

Activity 5-2 (Worksheet 5-1)

	DIRECTIONS PAGE		REASONING PAGE		
	Teacher Rating On Directions	Score On Directions	Conserve #1	Conserve #2	Conserver
KEY	5 4 3 2 1 0	5 4 3 2 1 0	[✓ A] B C	A [✓ B] C	YES NO
1.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
2.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
3.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
4.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
5.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
6.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
7.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
8.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
9.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
10.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
11.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
12.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
13.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
14.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
15.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
16.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
17.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
18.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
19.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
20.	5 4 3 2 1 0	5 4 3 2 1 0	A B C	A B C	YES NO
TOTALS	_ _ _ _ _ _	_ _ _ _ _ _	_ _ _	_ _ _	___ ___

Does this review give an accurate indication of student understanding? ☐ YES ☐ NO

If not, what other evidence do you have of student learning?

Puzzle Completion. For each student, circle the appropriate rating. Circle YES if he was able to complete the puzzle without help. Circle HELP if he needed assistance in putting the puzzle together. Circle NO if he was unable to complete the puzzle. If a student experienced difficulty, he may be experiencing problems in perception and need further observation to determine the existence or scope of the problem.

Sorting Into Two Groups. If a student was able to sort all the pictures into two logical groups without help, circle YES. Circle HELP if he was able to sort the pictures on his own after being told the names of two possible groups. Circle NO if he was unable to sort the pictures into two logical groups.

Naming Three Groups. Circle the maximum number of groups the student was able to appropriately name after putting the puzzle together. Refer to his written responses and accept any reasonable labels.

Now turn to the Background and Development Section of the Student Record of Progress and find the page on development in reasoning. In the column headed "Activity 5-5, Grouping," circle HIGH if the student completed the puzzle and sorted the groups without help and was able to name the three groups. Circle LOW if the student could name less than two groups and NO or HELP was circled for the other two tasks. Rate the remaining students as having SOME ability to group and classify things.

Children rated low will require many experiences to acquire the ability to categorize. Provide informal opportunities to group things for such student periodically throughout the year.

After circling individual responses, write the totals for each column in the space provided.

Ac

	PUZZLE CO	
	1	
KEY	YES	HE
STUDMBER 1.	YES	HE
2.	YES	HE
3.	YES	HE
4.	YES	HE
5.	YES	HE
6.	YES	HE
7.	YES	HE
8.	YES	HE
9.	YES	HE
10.	YES	HE
11.	YES	HE
12.	YES	HE
13.	YES	HE
14.	YES	HE
15.	YES	HE
16.	YES	HE
17.	YES	HE
18.	YES	HE
19.	YES	HE
20.	YES	HE
TOTALS	___	___

Does this
understan

If not, wh

Teacher ______________________

TALLYSHEET 5-2
Activity 5-5 (Worksheet 5-3)

	DEVELOPMENT IN REASONING PAGE									
	PUZZLE COMPLETION			SORTING 2 GROUPS			NAMING 3 GROUPS			
	1			2			3			
KEY	YES	HELP	NO	YES	HELP	NO	3	2	1	0
STUDMBER 1.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
2.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
3.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
4.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
5.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
6.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
7.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
8.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
9.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
10.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
11.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
12.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
13.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
14.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
15.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
16.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
17.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
18.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
19.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
20.	YES	HELP	NO	YES	HELP	NO	3	2	1	0
TOTALS	___	___	___	___	___	___	_	_	_	_

Does this review give an accurate indication of student understanding? ☐ YES ☐ NO

If not, what other evidence do you have of student learning?

TALLYSHEET 5-3
Activity 5-10 (Worksheet 5-6

Directions for Scoring:

Questions 1, 2, 3, and 10: Circle the letter which the student has marked.

Questions 4 and 5: Circle the number of correct responses the student listed.

Question 6A: Circle YES if the student ordered the steps correctly.

Question 6B: Circle YES if the student correctly matched what happens with the name of the step.

Question 9: Circle YES if the student listed the river as the town's water source.

See the Guidelines and Interpretation Section of Activity 5-10 for instructions for recording results in the Student Record of Progress.

	NUMBER AND MEASUREMENT PAGE		CO		
	USE OF BALANCE		WATER CONTENT	WATER USES	
	#1	#2	#3	#4	#
KEY	Before A B C D	After A B C D	Over 1/2 A B C D	Water Use 3 2 1 0	Save 3 2
1.	A B C D	A B C D	A B C D	3 2 1 0	3 2
2.	A B C D	A B C D	A B C D	3 2 1 0	3 2
3.	A B C D	A B C D	A B C D	3 2 1 0	3 2
4.	A B C D	A B C D	A B C D	3 2 1 0	3 2
5.	A B C D	A B C D	A B C D	3 2 1 0	3 2
6.	A B C D	A B C D	A B C D	3 2 1 0	3 2
7.	A B C D	A B C D	A B C D	3 2 1 0	3 2
8.	A B C D	A B C D	A B C D	3 2 1 0	3 2
9.	A B C D	A B C D	A B C D	3 2 1 0	3 2
10.	A B C D	A B C D	A B C D	3 2 1 0	3 2
11.	A B C D	A B C D	A B C D	3 2 1 0	3 2
12.	A B C D	A B C D	A B C D	3 2 1 0	3 2
13.	A B C D	A B C D	A B C D	3 2 1 0	3 2
14.	A B C D	A B C D	A B C D	3 2 1 0	3 2
15.	A B C D	A B C D	A B C D	3 2 1 0	3 2
16.	A B C D	A B C D	A B C D	3 2 1 0	3 2
17.	A B C D	A B C D	A B C D	3 2 1 0	3 2
18.	A B C D	A B C D	A B C D	3 2 1 0	3 2
19.	A B C D	A B C D	A B C D	3 2 1 0	3 2
20.	A B C D	A B C D	A B C D	3 2 1 0	3 2
TOTALS	----	----	----	----	---

Does this review give an accurate indication of stud

If not, what other evidence do you have of student le

Teacher ______________________________

TALLYSHEET 5-3
Activity 5-10 (Worksheet 5-6 and 5-7)

R AND ENT PAGE	CONCEPTS PAGE						
ALANCE	WATER CONTENT	WATER USES		WATER TREATMENT			
#2	#3	#4	#5	#6A	#6B	#9	#10
After A B C D	Over 1/2 A B C D	Water Use 3 2 1 0	Save Water 3 2 1 0	Order Of Steps	What Happens	Source	False Items A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
A B C D	A B C D	3 2 1 0	3 2 1 0	YES NO	YES NO	YES NO	A B C D E
- - - -	- - - -	- - - -	- - - -	— —	— —	— —	- - - - -

review give an accurate indication of student understanding? ☐ YES ☐ NO

at other evidence do you have of student learning?

TALLYSHEET 5-4
Activity 5-16 (Picture Chart Ratin

Rate each student's picture chart, marking YES or NO to indicate inclusion of each of the four components:

1. Evaporation: a lake, river, ocean, pool, pond, waterfall, dam, reservoir, wet clothes, barrel of water, stream, or any other picture showing a body or collection of water.

2. Condensation: a cloud, fog, drops on the outside of a cold glass.

3. Precipitation: rain, snow falling, snow on the ground, sleet, hail, thunder, lightening, puddles or rain water, or any other picture suggesting precipitation.

4. Cycle: arrows should be drawn connecting all parts of the cycle. An arrow should be shown going from evaporation to condensation, from condensation to precipitation, and from precipitation back to evaporation. If a picture of land or people was included, the arrow from precipitation should go to the land or people and then to evaporation.

If additional features are included, note them. Then use the following criteria to enter a judgment of student understanding of the water cycle concept on the "Concepts" page of the Student Record of Progress:

HIGH--Included all four components on chart.
SOME--Omitted one step in the cycle, or arrows incorrectly placed.
LOW---Picture chart includes less than three of the four components.

Next turn to the Participation Section of the Student Record of Progress. On the Cooperation and Perserverance page, find the Task (T) column for Activity 5-16, and instead of using +'s and -'s, rate each student on the following categories:

N = No assistance needed. Completed picture on own.

S = Some assistance or encouragement needed, but close supervision not required.

M = Much assistance or supervision required. Could not select pictures or decide what to do without help.

	Source of Evaporation 1	C s
KEY	YES NO	Y
1.	YES NO	Y
2.	YES NO	Y
3.	YES NO	Y
4.	YES NO	Y
5.	YES NO	Y
6.	YES NO	YE
7.	YES NO	YE
8.	YES NO	YE
9.	YES NO	YE
10.	YES NO	YE
11.	YES NO	YE
12.	YES NO	YE
13.	YES NO	YE
14.	YES NO	YE
15.	YES NO	YE
16.	YES NO	YE
17.	YES NO	YE
18.	YES NO	YE
19.	YES NO	YE
20.	YES NO	YE
TOTALS	___ ___	___

Does this r
understandi

If not, wha

Teacher ______________________________

TALLYSHEET 5-4
Activity 5-16 (Picture Chart Ratings)

	CONCEPT PAGE					
	Source of Evaporation	Condensation	Precipitation	Arrows Showing Cycle	Additional Features	Record in Concepts Section
	1	2	3	4		Understanding of Water Cycle
KEY	YES NO	YES NO	YES NO	YES NO		
1.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
2.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
3.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
4.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
5.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
6.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
7.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
8.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
9.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
10.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
11.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
12.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
13.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
14.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
15.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
16.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
17.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
18.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
19.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
20.	YES NO	YES NO	YES NO	YES NO	___________	HIGH SOME LOW
TOTALS	___ ___	___ ___	___ ___	___ ___	___________	____ ____ ____

Does this review give an accurate indication of student understanding? ☐ YES ☐ NO

If not, what other evidence do you have of student learning?

O to indicate

d, waterfall,
stream, or
n of water.

side of a

he ground,
rain water,
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parts of the
vaporation to
ion, and from
ure of land
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Could not
ut help.

TALLYSHEET 5-5
Activity 5-21 (Worksheet 5-11)

Circle student responses for each question as outlined below. NOTE: the items on the tallysheet have been grouped for purposes of interpretation and are not in sequential order. Be certain that you record data in the correct columns.

For Questions 1, 3, 5, 4, 6, 7, 8, 9, 10, and 11 circle the response(s) each student marked. For Question 2, circle the letters which correspond with the items each student answered correctly.

Write in the group totals for each choice. Review the group totals to identify any items with which groups of students had difficulty. If you find such items, further activities will be necessary before proceeding to the next core.

After reviewing the group totals and taking note of any necessary group work, turn to the end of Activity 5-21 for instructions for summarizing individual results in the Student Record of Progress.

	NUMBERS PAGE				PROBLEM SOLVING PAGE														
	Using a Graph				Knowing Question				What Varies							C		
	2				1				3				5			4		
	15	1960	20,000	1970	A	B	C	D	A	B	C	D	A	B	C	A	B	C
1.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
2.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
3.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
4.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
5.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
6.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
7.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
8.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
9.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
10.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
11.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
12.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
13.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
14.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
15.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
16.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
17.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
18.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
19.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
20.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C
TOTALS	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_

Does this review give an accurate indication of studen

If not, what other evidence do you have of student lea

Teacher________________________

TALLYSHEET 5-5
Activity 5-21 (Worksheet 5-11)

PROBLEM SOLVING PAGE					CONCEPT PAGE				
Knowing Question	What Varies		Outcomes		Pollution	Water Conservation			
1	3	5	4	6	7	8	9	10	11
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
A B C D	A B C D	A B C	A B C D	A B C D	A B C D	A B C	A B C	A B C	A B C
_ _ _ _	_ _ _ _	_ _ _	_ _ _ _	_ _ _ _	_ _ _ _	_ _ _	_ _ _	_ _ _	_ _ _

iew give an accurate indication of student understanding? ☐ YES ☐ NO

other evidence do you have of student learning?

Following Directions.

Before scoring the worksheet, rate each student's ability to follow a series of verbal directions in the teacher rating column on this tallysheet. Circle the number of parts of the total direction which you feel each student will complete successfully when scoring the worksheet. Circle the actual number of parts of the direction which each student completed successfully in the score column.

For each of the Questions 1-5 on Worksheet 5-13, circle the response each student has marked.

Record the group totals in the spaces below each column to give you an overall picture of the class. Send a copy of this tallysheet to BSCS. After scoring the worksheet, turn to the Progress in Following Directions Section of the Student Record of Progress and copy the rating and actual score for each student. Also note who needs the most help.

Then turn to the Concept page and record the following: In the column marked Activity 5-26, Carbon Dioxide, circle YES if the student marked the correct answer for Question 1. In the column marked Activity 5-26, Oxygen, circle YES if the student marked the correct answer for both Questions 2 and 3. In the column marked Activity 5-26, Interdependence, circle YES if the student marked the correct answer for Question 4. In the column marked Activity 5-26, Control, circle YES if the student marked the correct answer for Question 5.

TALLYSHEET 5-6
Activity 5-26 (Worksheet 5-13)

	DIRECTIONS PAGE		
	Following Directions		Carbon Dioxide
	Teacher Rating	Score	1
KEY	0 1 2 3	0 1 2 3	A B C D
1.	0 1 2 3	0 1 2 3	A B C D
2.	0 1 2 3	0 1 2 3	A B C D
3.	0 1 2 3	0 1 2 3	A B C D
4.	0 1 2 3	0 1 2 3	A B C D
5.	0 1 2 3	0 1 2 3	A B C D
6.	0 1 2 3	0 1 2 3	A B C D
7.	0 1 2 3	0 1 2 3	A B C D
8.	0 1 2 3	0 1 2 3	A B C D
9.	0 1 2 3	0 1 2 3	A B C D
10.	0 1 2 3	0 1 2 3	A B C D
11.	0 1 2 3	0 1 2 3	A B C D
12.	0 1 2 3	0 1 2 3	A B C D
13.	0 1 2 3	0 1 2 3	A B C D
14.	0 1 2 3	0 1 2 3	A B C D
15.	0 1 2 3	0 1 2 3	A B C D
16.	0 1 2 3	0 1 2 3	A B C D
17.	0 1 2 3	0 1 2 3	A B C D
18.	0 1 2 3	0 1 2 3	A B C D
19.	0 1 2 3	0 1 2 3	A B C D
20.	0 1 2 3	0 1 2 3	A B C D
TOTALS	_ _ _ _	_ _ _ _	_ _ _ _

Does this review give an accurate indi

If not, what other evidence do you hav

TALLYSHEET 5-6
ctivity 5-26 (Worksheet 5-13)

Teacher ____________________

DIRECTIONS PAGE		CONCEPT PAGE				
Following Directions		Carbon Dioxide	Oxygen		Interdependence	Control
Teacher Rating	Score	1	2	3	4	5
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
0 1 2 3	0 1 2 3	A B C D	A B C D	A B C D	A B C D	A B C D
_ _ _ _	_ _ _ _	_ _ _ _	_ _ _ _	_ _ _ _	_ _ _ _	_ _ _ _

Does this review give an accurate indication of student understanding? ☐ YES ☐ NO

If not, what other evidence do you have of student learning?

TALLYSHEET 5-7
Activity 5-27, (Worksheet 5-14)

Response to Questions. Use the form below to record the responses from Worksheet 5-14 by circling student responses. There are two parts to each numbered question. The first answer to each question should be yes, indicating that there is pressure on the object or person. Circle YES if the student answered yes, and NO if he answered no. The second answer to each question should identify the pressure. Circle the answer the student gave. If you circle OTHER, write the student's answer in the blank provided.

When you have completed rating each student, put group totals in the space provided. This will help you with an overall picture of the class.

See the end of Activity 5-27 for instructions for recording results in the Student Record of Progress.

					CONC
	WOMAN WITH BASKET #1			BOOKSHELF #2	
KEY	YES NO	BASKET &/OR AIR	OTHER	YES NO	BOOKS &/OR A
1.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
2.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
3.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
4.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
5.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
6.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
7.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
8.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
9.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
10.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
11.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
12.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
13.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
14.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
15.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
16.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
17.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
18.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
19.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
20.	YES NO	BASKET &/OR AIR		YES NO	BOOKS &/OR A
TOTALS					

Does this review give an accurate indication of stud

If not, what other evidence do you have of student l

Teacher ____________________

TALLYSHEET 5-7
Activity 5-27, (Worksheet 5-14)

CONCEPT PAGE										
WOMAN WITH BASKET		BOOKSHELF			BOY AND GIRL			BOY		
#1		#2			#3			#4		
SKET &/OR AIR	OTHER	YES NO	BOOKS &/OR AIR	OTHER	YES NO	BOY &/OR AIR	OTHER	YES NO	AIR	OTHER
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	
SKET &/OR AIR		YES NO	BOOKS &/OR AIR		YES NO	BOY &/OR AIR		YES NO	AIR	

eview give an accurate indication of student understanding? ☐ YES ☐ NO

t other evidence do you have of student learning?

Order. Circle YES if a student was able to order the pictures correctly (2, 3, 4, 5, 1) in Question 1. Circle NO if any of the pictures were out of order.

Describe. Circle the number of words a student wrote on the lines in Question 2.

Group. Circle YES if a student was able to put the pictures into two groups for Question 3. Circle NO if a student did not suggest groups.

Label. Circle YES if a student was able to assign a logical label for both of the groups for Question 3. Circle NO if he was unable.

Describe. Circle the number of words correctly assigned to the pictures. Descriptive words which probably do not apply are: natural, pretty, funny, bright, furry, wet, and clean. But, allow flexibility and use your judgment.

Add group totals on the lines provided below.

Recording in the Student Record of Progress:

Question 1 assesses the student's observational abilities. Turn to the Development of Experience page in the Student Record of Progress. Find the column marked Activity 5-31, Order. Circle YES if the student was able to correctly observe and order the picture as indicated by a YES on the tallysheet.

Question 2 and 5 assess the student's ability to describe. Find the column marked Activity 5-31, Describe. Circle HIGH if students listed five or more descriptive words for Question 2 and circled 11-21 words in Question 5. Circle LOW if students listed less than two words for Question 2 and/or circled less than five words for Question 5. All other students may be rated as having SOME descriptive skills.

Question 3 and 4 assess the student's ability to group objects. Turn to the Development in Reasoning page of the Student Record of Progress, find the column marked Activity 5-31, Grouping. Circle YES if the student was able to group the objects and label the groups as indicated by a YES on the tallysheet for both Questions 3 and 4.

T

Activity

	EXPERIENCE PA			
	ORDER		DESCR	
	1		2	
KEY	YES	NO	0-1	2-4
1.	YES	NO	0-1	2-4
2.	YES	NO	0-1	2-4
3.	YES	NO	0-1	2-4
4.	YES	NO	0-1	2-4
5.	YES	NO	0-1	2-4
6.	YES	NO	0-1	2-4
7.	YES	NO	0-1	2-4
8.	YES	NO	0-1	2-4
9.	YES	NO	0-1	2-4
10.	YES	NO	0-1	2-4
11.	YES	NO	0-1	2-4
12.	YES	NO	0-1	2-4
13.	YES	NO	0-1	2-4
14.	YES	NO	0-1	2-4
15.	YES	NO	0-1	2-4
16.	YES	NO	0-1	2-4
17.	YES	NO	0-1	2-4
18.	YES	NO	0-1	2-4
19.	YES	NO	0-1	2-4
20.	YES	NO	0-1	2-4
TOTALS	___	___	___	___

Does this review g

If not, what other

TALLYSHEET 5-8

Activity 5-31 (Worksheet 5-16)

Teacher __________

	EXPERIENCE PAGE					REASONING PAGE				EXPERIENCE PAGE		
	ORDER		DESCRIBE			GROUP		LABEL		DESCRIBE		
	1		2			3		4		5		
KEY	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
1.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
2.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
3.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
4.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
5.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
6.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
7.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
8.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
9.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
10.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
11.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
12.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
13.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
14.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
15.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-10	11-21
16.	YES	NO	0-1	2-4	5-10	YES	NO	YES	NO	0-5	6-11	11-21
17.	YES	NO	0-1	2-4	5-11	YES	NO	YES	NO	0-5	6-11	11-21
18.	YES	NO	0-1	2-4	5-11	YES	NO	YES	NO	0-5	6-11	11-21
19.	YES	NO	0-1	2-4	5-11	YES	NO	YES	NO	0-5	6-11	11-21
20.	YES	NO	0-1	2-4	5-11	YES	NO	YES	NO	0-5	6-11	11-21
TOTALS	___	___	___	___	___	___	___	___	___	___	___	___

Does this review give an accurate indication of student understanding?

☐ YES ☐ NO

If not, what other evidence do you have of student learning?

Directions for Scoring

Question 1: Circle YES if the student wrote 20 as a response.

Questions 2, 3, 4, 6, 7, 8, 9, 10, 11, and 12: Circle the letters which the student marks for each question.

Question 5: Circle the answer the student marked for each letter A through F.

Directions for Recording Results in the Student Record of Progress.

Question Number 1 assesses the student's ability to read a graph. Turn to the numbers and measurements page of the Student Record of Progress and find the column marked Activity 5-34, Reading a Graph. Circle YES if the student answered the question correctly. Circle NO if he did not.

Question Number 2 relates to the student's ability to read a graph. However, it involves a higher degree of problem-solving ability and should not be used to judge a student's success in reading graphs. For convenience, it has been included in the numbers and measurements page of the Student Record of Progress. Find the column marked Activity 5-34, Translating Data. Circle YES if the student marked Choice B.

Question Number 3 assesses the student's understanding of the concept of fumes being dangerous to living things. Turn to the concept page of the Student Record of Progress and find the column marked Activity 5-34, Fumes Dangerous to Living Things. Circle YES if the student marked B as a response.

Question Number 4 assesses the student's understanding of controlling variables. Turn to the problem-solving page of the Student Record of Progress and find the column marked Activity 5-34, Controlling Variables. Circle YES if the student marked B and/or D.

Questions 5 and 6 assess the concept of fumes being dangerous to man. Turn to the concept page of the Student Record of Progress and find the column marked Activity 5-34, Fumes Dangerous To Man. Circle YES if the student answered five of the six parts of Question 5 correctly and also answered Question 6 correctly. Circle NO if the student missed more than one part of Question 5 or missed Question 6.

Question 7 assesses the student's ability to identify variables and set up an experiment. Turn to the problem-solving page of the Student Record of Progress and find the column marked Activity 5-34, Setting Up Experiments. Circle YES if the student answered Question 7 correctly. REMEMBER: Question 7 assesses higher problem-solving skills and should be used to find out where students are rather than to judge their success. Students who do not answer correctly need more opportunities to produce such skills.

Questions 8 through 12 are value judgment questions. No results will be recorded in the Student Record of Progress.

Teacher________________________________

ponse.

he letters which the student

ch letter A through F.

f Progress.

a graph. Turn to the
ogress and find the
S if the student answered

d a graph. However, it
hould not be used to judge
it has been included in
f Progress. Find the
S if the student marked

the concept of fumes being
the Student Record of Progress
to Living Things. Circle YES

controlling variables. Turn
ress and find the column
if the student marked B

rous to man. Turn to the
he column marked Activity 5-34,
ed five of the six parts of
ly. Circle NO if the student
n 6.

iables and set up an experi-
cord of Progress and find the
cle YES if the student answered
her problem-solving skills and
to judge their success.
ies to produce such skills.

results will be recorded in the

TALLYSHEET 5-9

Activity 5-34 (Worksheet 5-18 A, B, C, D, and E)

	NUMBERS AND MEASUREMENTS PAGE		CONCEPT PAGE	PROBLEM-SOLVING PAGE
	Reading A Graph	Translating Data	Fumes Dangerous To Living Things	Controlling Variables
	1	2	3	4
KEY	YES NO	A B C D	A B C D	A B C D
1.	YES NO	A B C D	A B C D	A B C D
2.	YES NO	A B C D	A B C D	A B C D
3.	YES NO	A B C D	A B C D	A B C D
4.	YES NO	A B C D	A B C D	A B C D
5.	YES NO	A B C D	A B C D	A B C D
6.	YES NO	A B C D	A B C D	A B C D
7.	YES NO	A B C D	A B C D	A B C D
8.	YES NO	A B C D	A B C D	A B C D
9.	YES NO	A B C D	A B C D	A B C D
10.	YES NO	A B C D	A B C D	A B C D
11.	YES NO	A B C D	A B C D	A B C D
12.	YES NO	A B C D	A B C D	A B C D
13.	YES NO	A B C D	A B C D	A B C D
14.	YES NO	A B C D	A B C D	A B C D
15.	YES NO	A B C D	A B C D	A B C D
16.	YES NO	A B C D	A B C D	A B C D
17.	YES NO	A B C D	A B C D	A B C D
18.	YES NO	A B C D	A B C D	A B C D
19.	YES NO	A B C D	A B C D	A B C D
20.	YES NO	A B C D	A B C D	A B C D
TOTALS	___ ___	_ _ _ _	_ _ _ _	_ _ _ _

SIDE A

TALLYSHEET 5-9
Activity 5-34 (Worksheet 5-18 A, B, C, D, and E)

	CONCEPT PAGE							PROBLE SOLVING Setting Experim
	Fumes Dangerous To Man							
	5						6	7
	A	B	C	D	E	F		
KEY	**YES** NO	**YES** NO	**YES** NO	**YES** NO	YES **NO**	YES **NO**	**A** B C D	A B C
1.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
2.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
3.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
4.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
5.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
6.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
7.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
8.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
9.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
10.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
11.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
12.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
13.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
14.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
15.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
16.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
17.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
18.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
19.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
20.	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C
TOTALS	___ ___	___ ___	___ ___	___ ___	___ ___	___ ___	___ ___ ___ ___	___ ___ ___

Does this review give an accurate indication of student understandi

If not, what other evidence do you have of student learning?

ALLYSHEET 5-9
rksheet 5-18 A, B, C, D, and E)

EPT PAGE				PROBLEM-SOLVING PAGE Setting Up An Experiment					
ngerous To Man					Value Judgments				
			6	7	8	9	10	11	12
D	E	F							
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B
ES NO	YES NO	YES NO	A B C D	A B C D	A B	A B	A B	A B	A B

ccurate indication of student understanding? ☐ YES ☐ NO

e do you have of student learning?

SIDE B

TALLYSHEET 5-10
Activity 5-35 (Worksheet 5-19 through 5-2

All instructions for scoring Worksheets 5-19 through 5-23 and for recording results in the Student Record of Progress are given in Activity 5-35.

	CONCEPTS PAGE															
	Water Content		Water Use										Saving Water		Water	
	1		2								3		4		5	
KEY	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
1.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
2.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
3.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
4.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
5.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
6.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
7.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
8.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
9.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
10.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
11.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
12.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
13.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
14.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
15.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
16.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
17.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
18.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
19.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
20.	A	B	0	1	2	3	4	5	6	M	YES	NO	YES	NO	YES	NO
TOTALS																

Teacher ______________________________

TALLYSHEET 5-10
ctivity 5-35 (Worksheet 5-19 through 5-23)

CONCEPTS PAGE									
Water Use		Saving Water	Water Source		Water Treatment				
2	3	4	5	6	7	8	9	10	11
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
3 4 5 6 M	YES NO	YES NO	YES NO	YES NO	YES NO	A B C D	A B C D	A B C D	A B C D
_ _ _ _ _	__ __	__ __	__ __	__ __	__ __	_ _ _ _	_ _ _ _	_ _ _ _	_ _ _ _

SIDE A

TALLYSHEET 5-10

Activity 5-35 (Worksheet 5-19 through 5-23)

					CONCEPTS PAGE		
	Water Cycle	Fate of The River	Value Judgment	Population And Water	Oxygen		Ox Car
	12	13	14	15	16	17	1
KEY	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
1.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
2.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
3.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
4.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
5.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
6.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
7.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
8.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
9.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
10.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
11.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
12.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
13.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
14.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
15.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
16.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
17.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
18.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
19.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES
20.	1 2 3	LOW SOME HIGH	YES NO	A B C D	A B C D	A B C D	YES

TOTALS ___

Does this review give an accurate indication of student understand

If not, what other evidence do you have of student learning?

TALLYSHEET 5-10

tivity 5-35 (Worksheet 5-19 through 5-23)

	CONCEPTS PAGE								
alue dgment	Population And Water	Oxygen		Oxygen and Carbon Dioxide		Wind & Weather	Wind & Water	Things In Air	Air Pollution
14	15	16	17	18	19	20	21	22	23
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
ES NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO
S NO	A B C D	A B C D	A B C D	YES NO	A B C D	A B C D	A B C D	YES NO	YES NO

accurate indication of student understanding? ☐ YES ☐ NO

ce do you have of student learning?

SIDE B

UNIT V OVERVIEW

This unit is organized in two parts, one on water, the other on air. The activity sequence is, however, continuous. The first part begins with a core of activities which establishes our uses of water. These uses extend from the basic biological needs of the student to the complex requirements of the community. The second core traces the sources of water from the tap at hand to its basic geologic origin. After the availability of water has been established, the problem of suitable preparation is studied in detail. In this core, community water treatment processes are compared with, and related to, the natural water cycle. The work on water is concluded with an examination of the broad problems of water management with special emphasis on the concept, and consequences, of pollution.

The second part of the unit consists of three cores on air. The first core emphasizes our need for air and introduces the idea that air is a mixture of several components. The two most important of these to us are oxygen and carbon dioxide. The second core of activities involves the physical properties of air and how these properties influence atmospheric conditions in time and space. The terminal core in this unit treats air in a manner similar to the last core on water. Man-made additives to the air are examined in terms of their characteristics as well as their impact on the environment.

Air and water a
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UNIT V RATIONALE

Air and water are both cycling resources. Historically we have treated both as unlimited resources (with a few obvious local exceptions in water). The current trend of environmental concern has focused attention on these two components as not only limited but also vulnerable.

Perhaps no other resources have been taken more for granted. However the rapid escalation of the pollution of these resources makes it imperative that we all consider their importance and significance in our lives.

The experiences in this unit not only are designed to develop positive and protective attitudes towards air and water but to suggest the effect they have on the quality of life. Students explore the role of air and water in the lives of their own families as well as the neighborhood and community in which they live.

BSCS

Me and my Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. NEED FOR WATER

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

The two parts of this unit wil
air and water as major components
Part 1 emphasizes the importan
environment by helping the student

1. Understand the need for water
2. Recognize the sources of wate
3. Realize the problems associat
4. Realize the problems associat
5. Recognize the impact of water
6. Understand the broad problems

Part 2 emphasizes the nature o
by helping the student to:

7. Understand the composition of
8. Realize that the quality of a
9. Realize that substances are c
10. Comprehend the impact of air

C

1. Recognize the diversity of wat
2. Develop a quantitative view of
3. Recognize the universal import

IT V. AIR AND WATER IN MY ENVIRONMENT

RE A. NEED FOR WATER

BSCS

UNIT V GOALS

The two parts of this unit will serve to develop an appreciation of the roles of air and water as major components of our environment.

Part 1 emphasizes the importance of water as a vulnerable component of our environment by helping the student to:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Part 2 emphasizes the nature of air as a complex component of our environment by helping the student to:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

CORE A OBJECTIVES

1. Recognize the diversity of water uses in everyday life.
2. Develop a quantitative view of the needs for water.
3. Recognize the universal importance of water for life.

UNIT V OVERVIEW

Air and water are both cycling resources. Historically we have treated both as unlimited resources (with a few obvious local exceptions for water). The current trend of environmental concern has focused attention on these two components as not only limited resources but also vulnerable ones.

This unit is organized in two parts -- one on water, the other on air. The activity sequence is, however, continuous. The first part begins with a core of activities that establish our various uses of water. These uses extend from the basic biological needs of the student, as a human being, to the complex requirements of the community. The second core traces the source of water from the tap at hand to a basic geologic origin. After the source of water has been established, the problem of suitable preparation is studied in detail. In this core, community water treatment processes are compared with, and related to, the natural water cycle. The work on water is concluded with an examination of the broad problems of water management, with special emphasis on the concept and consequences of pollution.

The second part of the unit consists of three cores of activities on air. The first core emphasizes our need for air and introduces the idea that air is a mixture of several components. The two most important components for us are oxygen and carbon dioxide. The second core of activities involves the physical properties of air and how these properties influence atmospheric conditions in time and space. The last core of activities in this unit on air is similar to the last core on water. Man-made additives to the air are examined in terms of their characteristics as well as their impact on the environment.

NIT V. AIR AND WATER IN MY ENVIRONMENT

ORE A. NEED FOR WATER

BSCS

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Me and my
Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. NEED FOR WATER

CORE A RATIONALE

Water is an environmental resource that has demonstrable importance to everyone's daily life. Man has a specific biological need for water and this need is constant. There are many other needs for water that are related to modern living. In this core, the students will have the opportunity to examine critically their own needs for water on a quantitative basis. They will also develop an order of importance for the satisfaction of these needs. This order of importance may vary from place to place and from time to time. The order of priority may not, however, necessarily reflect the widening perspective of self, home, school, community, etc. In some cases the needs of the larger group may be considered more important than the needs closer to self.

BACKGROUN

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natural lake or river.
round water supply is t
reservoir. A reservoir

BACKGROUND INFORMATION FOR THE TEACHER

Technically water is a renewable resource. Nature has its own recycling system for a reusable water supply. This does not mean that it can be used in unlimited quantities. Man has specific and absolute needs for water on a physiological basis. We also have important needs for water that are related to our role in society. These needs may be characterized in terms of both quality and quantity. Providing for these needs often poses problems that vary widely from locality to locality.

Aside from specific biological needs, we all have daily household requirements for bathing, washing, cooking, and so forth. These needs tend to be similar over wide geographic and socioeconomic bounds. Second-order family needs tend to vary more widely, depending on circumstance. A farm family may quite naturally place high priority on water requirements for livestock and crops. Suburbanites may be oriented toward lawns, gardens, and washing cars. All of these uses may be entirely foreign to the city student. A deliberate attempt should be made to broaden the perspective of all students.

The sources of water may vary considerably from one situation to the next. Water may be directly available to the student from a tap or faucet. The water supply to this outlet may be an individual well or a municipal water main. In many cases it may come from a hand pump in or outside the house. The water in the main may come from a variety of sources. Municipal water supplies will vary from region to region. In some areas the source may be a well field which is essentially one or more large pumps drawing water from an underground supply, usually a gravel deposit. In many cases, a community will draw its water directly from a natural lake or river. A common practice to insure a continuous, year-round water supply is to build an artificial impoundment called a reservoir. A reservoir is usually created by building a dam at a narrow

BACKGROU

point in a natural st
watershed. Many comm
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BACKGROUND INFORMATION FOR THE TEACHER (continued)

point in a natural stream system that drains a geographic area called a watershed. Many communities have more than one reservoir. It should be noted that not all reservoirs are intended to function as water supplies. Some are intended for commerce, electricity, irrigation, recreation, or flood control. In the latter cases, management practice often conflicts with possible use as a water supply. Consequently, the problems of the preparation of usable water, disposal of waste water, and water resource management in general will again vary from region to region.

Me and my · Environment

UNIT V
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in*
be prepared several days or weeks in advance. Use
a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italic*
5-1. A Beginning Days needed: 1	Classroom animal		*Preferably*
	Classroom pond		*Preferably*
		"Science Is..." poster	
		Chart 5-1	Water chart
5-2. Clues to Success: Background and Understanding Days needed: 2	Cold water		About one q experimen
	Soft drink mix		For experim mix such
	Modeling clay		One teaspoo
	Paper towels		For cleanin
	Objects to weigh		Such as pap
		Test tubes, 25 X 200 mm	Two per pai
		Test tubes, 18 X 150 mm	Two per pai
		Test tubes, 13 X 100 mm	Two per pai
		Beakers (250 ml)	Two per pai
		Beakers (400 ml)	One per pai
		Test tube racks	One per pai
		Equal-arm balance kits	Four
		Worksheet 5-1	Pad of 20 s
		Tallysheet 5-1	
5-3. Living Things Are Mostly Water Days needed: 2	35 mm Slide projector		
	Knife and cutting board		Or a cuttin
	Paper muffin cups		Four per st
	Oven		For drying
	Fresh fruits and vegetables		Such as let
			A chunk siz

PLANNING GUIDE

vities (*indicated in italics* and an ↖ *in the margin*) must
ed several days or weeks in advance. Use this summary as
g and preparation schedule. All supplies needed are listed.

BSCS

upplies Needed	
Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Preferably the animal from the past year
	Preferably the pond animals from the past year
"*Science Is...*" poster	
Chart 5-1	Water chart
	About one gallon for mixing with the soft drink and experimenting with the clay
	For experimenting and drinking (about two large packages of a mix such as Kool-Aid)
	One teaspoon per pair of students, approximately one pound
	For cleaning spills and drips
	Such as paper clips, beans, and coins
Test tubes, 25 X 200 mm	Two per pair of students
Test tubes, 18 X 150 mm	Two per pair of students
Test tubes, 13 X 100 mm	Two per pair of students
Beakers (250 ml)	Two per pair of students
Beakers (400 ml)	One per pair of students
Test tube racks	One per pair of students
Equal-arm balance kits	Four
Worksheet 5-1	Pad of 20 sheets; one worksheet per student
Tallysheet 5-1	
	Or a cutting surface for each student pair
	Four per student pair
	For drying out fruits and vegetables
	Such as lettuce, apple, carrot, potato, orange
	A chunk size sample of each food per student group

Me and my·
Environment

UNIT V
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an*
be prepared several days or weeks in advance. U
a teaching and preparation schedule. All suppli

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ita*
5-3. Living Things Are Mostly Water (continued)		Worksheet 5-2 Slide 5-1 Slide 5-2 Slide 5-3 Equal-arm balance kits	Pad of Body ou Body ou Workshe Four
5-4. Uses of Water Days needed: 1	3 X 5 Index cards 35 mm Slide projector		Several in thi
		Slide 5-4 Slide 5-5 Slide 5-6 Slide 5-7 Slide 5-8 Slide 5-9	Street Dentist' Industri Floating Water be Hydroele
5-5. Priorities of Water Use Days needed: 2	3 X 5 Index cards Pins Bulletin board Scissors Tape Lined 8 1/2 X 11 inch paper		From Act For pinn One per One pair Masking One shee
		Worksheet 5-3 Tallysheet 5-2	Pad of 2

PLANNING GUIDE

tivities (*indicated in italics and an* ➤ *in the margin*) must
ared several days or weeks in advance. Use this summary as
ing and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
Worksheet 5-2	Pad of 20 sheets; one worksheet per student
Slide 5-1	Body outline
Slide 5-2	Body outline with water content
Slide 5-3	Worksheet 5-2
Equal-arm balance kits	Four
	Several dozen (three times the number of water uses listed in this Activity)
Slide 5-4	Street washer
Slide 5-5	Dentist's drill
Slide 5-6	Industrial cooling
Slide 5-7	Floating logs on a river
Slide 5-8	Water bed
Slide 5-9	Hydroelectric power
	From Activity 5-4
	For pinning water use cards
	One per class
	One pair per student
	Masking or cellophane
	One sheet per student
Worksheet 5-3	Pad of 20 sheets; one worksheet per student
Tallysheet 5-2	

Me and my· Environment

UNIT V
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in t*
be prepared several days or weeks in advance. Use t
a teaching and preparation schedule. All supplies n

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		(*Italics*
	Materials You Furnish	Materials in Supply Kit	
5-6. How Much Water Do I Use? Days needed: 2	Toothpaste		One tube
	Toothbrush		Have a stud
	One gallon jug		For measuri
	Water		Use for was
	Bucket or pail		For collect
		Measuring cup	For measuri
		Funnel	For pouring
		Worksheet 5-4	Pad of 20 s

PLANNING GUIDE

BSCS

ities (*indicated in italics and an* ➶ *in the margin*) must
d several days or weeks in advance. Use this summary as
and preparation schedule. All supplies needed are listed.

upplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
	One tube
	Have a student bring a toothbrush
	For measuring water use
	Use for washing teeth
	For collecting used water
Measuring cup	For measuring amount of water in a gallon
Funnel	For pouring from container to container
Worksheet 5-4	Pad of 20 sheets; one worksheet per student

BSCS

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:
None emphasized

Core A Objectives for the Student:
None emphasized

ENVIRONMENTAL THEME:
None emphasized

INQUIRY SKILLS:
Identifying

PROBLEM-SOLVING SKILLS:
Knowing Question and Task

PRACTICAL APPLICATION:
Recalling Science Experiences

Activity 5-1. A Beginning

This activity will serve to reacquaint the students with the classroom animal and the classroom pond. By discussing the "Science Is..." *poster, students will begin to think of what they did in science last year as well as what they will do this year.*

CTIVITY

oals for the Student:
one emphasized

Objectives for the Student:
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Beginning

ll serve to reacquaint the students om animal and the classroom pond. By Science Is..." poster, students will f what they did in science last year as y will do this year.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. NEED FOR WATER

ACTIVITY 5-1. A BEGINNING

During this activity, each student should:

- *--choose a picture on the* "Science Is..." *poster that reminds him of something done in science class during the previous year.*
- *--get reacquainted with the classroom animal and the classroom pond.*
- *--discuss each picture of Chart 5-1 and identify it as having something to do with water.*

ACTIVITY
5-1

MATERIALS

"Science Is..." poster
Chart 5-1
*Classroom animal
*Classroom pond

*Not furnished in materials kit

TEACHING STRATEGIES

Because Unit V begins the school year, this activity is meant to be relatively unstructured. It can be used to unpack the science equipment, refill the classroom pond get the classroom animal back to the room, and so forth

To get the students thinking about science once again, display the *"Science Is..."* poster where it can be seen by all students.

Ask a student to choose one picture on the poster that reminds him of something he did in science class last year. Ask him to tell what the picture reminds him of doing and allow other students to contribute their memories also.

Continue in this manner until all the pictures on the poster have been discussed. During this discussion suc terms as environment, microbes, and living things will most likely be used. Be sure to review the definitions of such terms as they are brought up.

Part I.

Science in the Past

When a student selects the picture entitled Loving Some Things on the *"Science Is..."* poster, draw his attention to the animals that were present in the classroom the year before by asking:

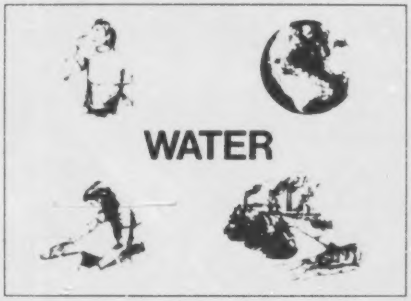
> WHAT LIVING THINGS DID WE HAVE IN OUR CLASSROOM LAST YEAR?

> LET'S GET OUR CLASSROOM READY FOR THEM AGAIN.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
V begins the school year, this activity is relatively unstructured. It can be used to cience equipment, refill the classroom pond, sroom animal back to the room, and so forth.	Students should:
tudents thinking about science once again, "*Science Is...*" poster where it can be seen nts.	
t to choose one picture on the poster that of something he did in science class last m to tell what the picture reminds him of low other students to contribute their .	
this manner until all the pictures on the been discussed. During this discussion such ronment, microbes, and living things will e used. Be sure to review the definitions as they are brought up.	
e Past	
t selects the picture entitled Loving Some "*Science Is...*" poster, draw his the animals that were present in the year before by asking:	
ING THINGS DID WE HAVE IN OUR M LAST YEAR?	--recall the classroom animal and the pond animals and state, "Our gerbil," "The fish," etc.
T OUR CLASSROOM READY FOR THEM AGAIN.	

MATERIALS

Chart 5-1



TEACHING STRATEGIES

At this time fill the pond with water, stones, and whatever other appropriate items are available. Prepare a place in the room for the animal to occupy. If students took care of the class animal and pond animals over the summer, make arrangements for these animals to be brought back to school. Also arrange new schedules for the feeding and care of the animals.

Part II.

Science in the Future

Display Chart 5-1 (Water Chart) where it can be seen by all students.

Say:

> THIS CHART IS A KIND OF MAP THAT SHOWS US WHAT WE WILL BE DOING IN SCIENCE DURING THE FIRST PART OF THIS YEAR. FOR THE NEXT SEVERAL WEEKS WE WILL BE TALKING ABOUT WATER AND DOING SOME ACTIVITIES WITH IT.

Point to the first picture on the chart (the boy).

Ask:

> WHAT DOES THIS PICTURE TELL YOU ABOUT WATER?

> THE FIRST GROUP OF WATER ACTIVITIES WILL BE ABOUT OUR NEED FOR WATER.

TEACHING STRATEGIES

the pond with water, stones, and propriate items are available. Prepare om for the animal to occupy. If e of the class animal and pond summer, make arrangements for these ught back to school. Also arrange the feeding and care of the animals.

ture

(Water Chart) where it can be seen

S A KIND OF MAP THAT SHOWS US WHAT OING IN SCIENCE DURING THE FIRST YEAR. FOR THE NEXT SEVERAL WEEKS ALKING ABOUT WATER AND DOING SOME ITH IT.

t picture on the chart (the boy).

IS PICTURE TELL YOU ABOUT WATER?

OUP OF WATER ACTIVITIES WILL BE ED FOR WATER.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--look at the picture of the boy and suggest such things as, "We drink water," "We use water."

ACTIVITY
5-1

MATERIALS

TEACHING STRATEGIES

Point to the second picture on the chart (the earth) and ask:

WHAT DOES THIS PICTURE TELL YOU ABOUT WATER?

THE SECOND GROUP OF WATER ACTIVITIES WILL BE ABOUT WHERE WE GET OUR WATER.

Point to the third picture on the chart (the dripping faucet) and ask:

WHAT DOES THIS PICTURE TELL YOU ABOUT WATER?

THE THIRD GROUP OF ACTIVITIES WE'LL DO WILL BE ABOUT WHAT WE DO TO OUR WATER SO WE CAN DRINK IT.

Point to the fourth picture on the chart (pollution) and ask:

WHAT DOES THIS PICTURE TELL YOU ABOUT WATER?

THE LAST GROUP OF ACTIVITIES WE DO WILL BE ABOUT KEEPING THE WATER CLEAN SO ALL LIVING THINGS CAN USE IT.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
econd picture on the chart (the earth)	
THIS PICTURE TELL YOU ABOUT WATER?	--look at the picture of the earth and suggest such things as, "That's where we live," "That's where our water is," "That's where we get our water."
D GROUP OF WATER ACTIVITIES WILL WHERE WE GET OUR WATER.	
hird picture on the chart (the dripping k:	
THIS PICTURE TELL YOU ABOUT WATER?	--look at the picture of the faucet and suggest such things as, "We get water from a faucet," "The water ran out," "We get thirsty."
GROUP OF ACTIVITIES WE'LL DO WILL WHAT WE DO TO OUR WATER SO WE CAN	
ourth picture on the chart (pollution)	
THIS PICTURE TELL YOU ABOUT WATER?	--look at the picture of the factory and suggest such things as, "We get our water dirty," "Factories use water," "We put dirty water in the stream."
GROUP OF ACTIVITIES WE DO WILL BE PING THE WATER CLEAN SO ALL LIVING USE IT.	

MATERIALS	TEACHING STRATEGIES
	TOMORROW (or whatever day you will begin) WE WILL BEGIN TO TALK ABOUT OUR NEED FOR WATER. Keep Chart 5-1 on display so it can be referred to in future activities.

TEACHING STRATEGIES

r whatever day you will begin)
IN TO TALK ABOUT OUR NEED FOR WATER.

n display so it can be referred to in
s.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have recalled a science activity from the previous year.
--have observed Chart 5-1.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE A
ACTIVITY 5-1

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Was the "Science Is..." poster valuable in helping students remember previous science activities? ☐ Yes ☐ No Comment:

13. Did the water chart stimulate discussion? ☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Was the "Science Is..." poster valuable in helping students remember previous science activities? ☐ Yes ☐ No Comment:

13. Did the water chart stimulate discussion? ☐ Yes ☐ No

14. What activities from last year were remembered and identified by students?

15. What percentage of the students verbally contributed to the discussion?

Side A

UNIT V, CORE A
ACTIVITY 5-1

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.

Core A Objectives for the Student:

1. Recognize the diversity of water uses in everyday life.

ENVIRONMENTAL THEME:

Diversity and Patterns

INQUIRY SKILLS:

Observing

PROBLEM-SOLVING SKILLS:

Experimenting

PRACTICAL APPLICATION:

Following Directions, Working within a Group, Practice in Weighing

Activity 5-2. Clues to Success: Background and Understanding

This first Clue to Success is designed to guide you in helping each child achieve success at his level. The scores and ratings you record should identify which children will need the most help with the materials in this unit.

The students will predict on their worksheets what they think is true. Then they will experiment to find out if they were right.

CTIVITY

oals for the Student:
. Understand the need for water.

Objectives for the Student:
. Recognize the diversity of water
uses in everyday life.

AL THEME:
ity and Patterns

LLS:
ing

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menting

PPLICATION:
ing Directions, Working within a
Practice in Weighing

lues to Success: Background and Understanding

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BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. NEED FOR WATER

ACTIVITY 5-2. CLUES TO SUCCESS: BACKGROUND AND UNDERSTANDING

During this activity, each student should:

- *--practice following directions.*
- *--review left and right.*
- *--observe the soft drink in the beaker and test tube.*
- *--complete Worksheet 5-1.*
- *--experiment with a given amount of liquid in different containers.*
- *--experiment with a given amount of clay molded into different shapes in the same liquid.*
- *--experiment with the use of the equal-arm balance.*
- *--work as a member of a team.*

ACTIVITY
5-2

MATERIALS

- Test tubes, 25 X 200 mm, 2 per pair
- Test tubes, 18 X 150 mm, 2 per pair
- Test tubes, 13 X 100 mm, 2 per pair
- Beakers, 250 ml, 2 per pair
- Beakers, 400 ml, 1 per pair
- Test tube racks, 1 per pair
- Equal-arm balance kits, 4
- Worksheet 5-1

*Cold water, 1 gallon
*Soft drink mix, 2 large packages
*Modeling clay, 1 teaspoon per pair, 1 piece 3/4 X 3/4 X 1 inch
*Paper towels
*Objects to weigh

*Not furnished in materials kit

TEACHING STRATEGIES

Use the Guide in the Background and Development Secti of the Student Record of Progress to score their responses. This will provide a basis for comparison later in the year.

In addition, this activity provides an opportunity fo students to review from Unit III or to learn to use the equal-arm balance.

Part I.

It is likely that some of your students have not yet developed the ability to think in abstract logical terms. They still need to work with concrete objects and to try out things to understand what happens. These children are concrete thinkers. They have the potential to think abstractly but have not yet reache that developmental stage. Some of the students respor to what they see and experience intuitively. For example, when the shape or position of things changes, these students will believe that the quantity has alsc changed. Through a variety of experiences during the year, many of the students will move toward abstract thinking.

Familiarize yourself with the scoring procedures befor using this activity in class. Complete your ratings o students on following directions prior to the activity Also, you may wish to review Measuring With a Balance (Unit III, Activity 3-11), and use it to guide or instruct students in the use of the equal-arm balance.

TEACHING STRATEGIES

e in the Background and Development Section
nt Record of Progress to score their
This will provide a basis for comparison
year.

this activity provides an opportunity for
review from Unit III or to learn to use
n balance.

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f the students will move toward abstract

yourself with the scoring procedures before
ctivity in class. Complete your ratings of
following directions prior to the activity.
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ctivity 3-11), and use it to guide or
dents in the use of the equal-arm balance.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Assemble the following for the demonstration part of the activity:

1 - 25 X 200 mm test tube
1 - 400 ml beaker
Container of soft drink mix, mixed according to directions
Test tube rack

In addition, assemble and clearly label the other materials listed for teams of two students. Pour the soft drink mix into the 250 ml beakers, one per team. Pour water into the 400 ml beakers, one per team. Trays are a handy way for students to move materials from a supply table to work areas. Trays are easily made by cutting the sides of cardboard boxes to a height of one inch.

The opportunity to be responsible for things is a valuable experience for children. Select someone to be in charge of the supply table. This student can serve as your assistant in this activity and help wash the equipment and put it away.

You may find the Participation Section of the Student Record of Progress a convenient way of recording this assistance and of seeing that all have the opportunity to play this role.

Begin class by saying:

> TODAY WE ARE GOING TO MAKE SOME GUESSES AND THEN DO SOME EXPERIMENTS TO FIND OUT IF OUR GUESSES WERE RIGHT. FOR AWHILE YOU ARE TO WORK BY YOURSELF AND NOT TELL ANYONE ABOUT YOUR GUESSES. THEN WE WILL SPLIT UP INTO TEAMS.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

llowing for the demonstration part of

)0 mm test tube
beaker
of soft drink mix, mixed
g to directions.
rack

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S. THEN WE WILL SPLIT UP INTO

ACTIVITY
5-2

MATERIALS

Worksheet 5-1

TEACHING STRATEGIES

> THE FIRST THING WE WILL DO IS TO PRACTICE FOLLOWING DIRECTIONS. LISTEN CAREFULLY! I WILL SAY THINGS ONLY TWICE.

> PUT YOUR RIGHT HAND ON YOUR RIGHT EAR.

Repeat this instruction and all instructions twice. Assist students who are confused about right and left.

> PUT YOUR RIGHT HAND ON YOUR LEFT ELBOW.

Try several more practice directions if students are confused.

Now that left and right and following directions have been reviewed, distribute Worksheet 5-1. Tell students to take out a pencil.

Then say:

> REMEMBER TO LOOK ONLY AT YOUR WORKSHEET. FOLLOW DIRECTIONS AND DO NOT TALK TO YOUR NEIGHBOR.
>
> FIND THE LINE FOR YOUR NAME. PRINT YOUR FIRST NAME AND YOUR LAST NAME.

Ask a student to write the date on the chalkboard, and say:

> ON THE LINE FOR THE DATE, COPY THE DATE EXACTLY AS IT IS WRITTEN ON THE CHALKBOARD.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ST THING WE WILL DO IS TO PRACTICE NG DIRECTIONS. LISTEN CAREFULLY! SAY THINGS ONLY TWICE.	
R RIGHT HAND ON YOUR RIGHT EAR.	--put their right hands on their right ears.
instruction and all instructions twice. nts who are confused about right and left.	
R RIGHT HAND ON YOUR LEFT ELBOW.	--put their right hands on their left elbows.
more practice directions if students are	
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R TO LOOK ONLY AT YOUR WORKSHEET. DIRECTIONS AND DO NOT TALK TO IGHBOR.	
E LINE FOR YOUR NAME. PRINT YOUR AME AND YOUR LAST NAME.	--print their first and last names.
t to write the date on the chalkboard,	
LINE FOR THE DATE, COPY THE DATE AS IT IS WRITTEN ON THE CHALKBOARD.	--copy the date on their worksheets.

MATERIALS

TEACHING STRATEGIES

TURN YOUR WORKSHEET OVER. WRITE HOW OLD YOU ARE ON THE BOTTOM LEFT SIDE OF THE WORKSHEET.

NOW WE ARE READY TO DO THE WORKSHEET. I WILL READ ALOUD WHILE YOU FOLLOW ON YOUR COPY. LISTEN VERY CAREFULLY.

Read the first part of the item:

> JIM FILLED A TEST TUBE WITH A SOFT DRINK AND POURED IT INTO A BEAKER. THEN HE FILLED THE TEST TUBE WITH THE SOFT DRINK AGAIN AS SHOWN BELOW. WATCH ME DO THIS.

Then hold up the test tube and beaker and name them. Be sure all can see.

Fill the test tube to the top with the soft drink; then pour it into the beaker.

Fill the test tube full of the soft drink again and hold it and the beaker up so all can see.

TEACHING STRATEGIES

WORKSHEET OVER. WRITE HOW OLD
N THE BOTTOM LEFT SIDE OF THE
.

E READY TO DO THE WORKSHEET. I [illegible]
ALOUD WHILE YOU FOLLOW ON YOUR
STEN VERY CAREFULLY.

part of the item:

D A TEST TUBE WITH A SOFT DRINK
D IT INTO A BEAKER. THEN HE
E TEST TUBE WITH THE SOFT DRINK
SHOWN BELOW. WATCH ME DO THIS.

he test tube and beaker and name them.
n see.

tube to the top with the soft drink;
nto the beaker.

tube full of the soft drink again and
e beaker up so all can see.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--write their ages on their worksheets.

MATERIALS

TEACHING STRATEGIES

Now read the rest of the item:

> DOES ONE CONTAINER HAVE MORE SOFT DRINK IN IT THAN THE OTHER?
>
> THE CHOICES ARE:
>
> THEY BOTH HAVE THE SAME AMOUNT.
> THE BEAKER HAS MORE.
> THE TEST TUBE HAS MORE.
> MARK AN X ON YOUR CHOICE.

Pause, then read the question and responses again.

Direct the class to turn their worksheets over.

Say:

> THIS TIME PRINT YOUR LAST NAME ONLY IN THE SPACE FOR YOUR NAME.

Now ask them to look at Number 2 as you read it:

> BOB PUT A PIECE OF CLAY INTO A BEAKER OF WATER AND THE WATER CAME UP TO THE LEVEL MARKED BY THE DOTTED LINE. BOB TOOK THE CLAY OUT AND BROKE IT INTO THREE PIECES AND PUT THE THREE PIECES BACK IN THE BEAKER. WHICH ONE OF THE PICTURES BELOW SHOWS HOW HIGH THE WATER IS NOW? MARK AN X ON YOUR CHOICE.

Pause, then read the whole item again.

Now group the class into teams of two by collecting their worksheets and looking at them to be sure that one member of each team marked the right answer to both items.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
rest of the item:	
E CONTAINER HAVE MORE SOFT DRINK IN THE OTHER?	
ICES ARE:	
TH HAVE THE SAME AMOUNT. KER HAS MORE. T TUBE HAS MORE. X ON YOUR CHOICE.	--mark Xs on their choices.
read the question and responses again.	
lass to turn their worksheets over.	
E PRINT YOUR LAST NAME ONLY IN THE R YOUR NAME.	--print their last names in the spaces provided.
to look at Number 2 as you read it:	
A PIECE OF CLAY INTO A BEAKER OF D THE WATER CAME UP TO THE LEVEL Y THE DOTTED LINE. BOB TOOK THE AND BROKE IT INTO THREE PIECES THE THREE PIECES BACK IN THE WHICH ONE OF THE PICTURES BELOW W HIGH THE WATER IS NOW? MARK AN R CHOICE.	--mark Xs on their choices.
ead the whole item again.	
class into teams of two by collecting ets and looking at them to be sure that each team marked the right answer to	

MATERIALS

TEACHING STRATEGIES

Say:

> NOW WE WILL HAVE A CHANCE TO FIND OUT IF YOU WERE RIGHT. DO THE THINGS THAT JIM AND BOB DID. FIRST MEASURE THE SOFT DRINK INTO DIFFERENT CONTAINERS. THEN MEASURE IT AGAIN AS YOU TAKE IT OUT. TRY IT AS MANY WAYS AS YOU CAN THINK OF.
>
> AS YOUR TURN COMES, EACH TEAM SHOULD PICK UP THE THINGS LISTED ON THE CHALKBOARD FROM THE SUPPLY TABLE.

Allow two teams at a time to visit the supply table to get the following things listed on the chalkboard:

1 Beaker of soft drink
2 Big test tubes
2 Medium test tubes
2 Little test tubes
1 Empty beaker
1 Beaker of water
1 Piece of clay

TEACHING STRATEGIES

**HAVE STUDENTS
WORK IN PAIRS**

HAVE A CHANCE TO FIND OUT IF YOU
DO THE THINGS THAT JIM AND BOB
MEASURE THE SOFT DRINK INTO
ONTAINERS. THEN MEASURE IT AGAIN
IT OUT. TRY IT AS MANY WAYS AS
NK OF.

N COMES, EACH TEAM SHOULD PICK UP
LISTED ON THE CHALKBOARD FROM THE
E.

at a time to visit the supply table to
g things listed on the chalkboard:

soft drink
cubes
st tubes
st tubes
ker
water
clay

**WORK
TIME**

ANTICIPATED STUDENT BEHAVIORS

Students should:

--pick up the supplies and do the two problems
that were on the worksheet.

MATERIALS

TEACHING STRATEGIES

Circulate from team to team. Before the students start on the clay and water experiments, have them recall Bob's experiment on the worksheet before trying their own experiments.

As students finish experimenting, have them return the supplies to the supply table. If time allows, continue the activity with Part II. Save Worksheet 5-1 for scoring and recording results. (See the end of this activity for instructions.) The teaspoons of clay will be used again in Part II of this activity.

Part II.

Before beginning this part of the activity, review Activity 3-11 so you are familiar with the procedure using the equal-arm balance. Some students will recall using it while others will require instruction in its use. Review and practice should be provided for all students. Consult Activity 3-11 for specific review suggestions.

Have students work in groups to use the scales to weigh things. Have them use the beads as measures of weight. Give them the opportunity to discover how the balance operates. Caution them that the scales will not tolerate rough treatment and that they should not attempt to weigh heavy or large objects.

TEACHING STRATEGIES

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nd water experiments, have them recall
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ution them that the scales will not
h treatment and that they should not
igh heavy or large objects.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--compare the appearance of the same amount of soft drink in many different containers; compare water levels with and without one or many pieces of clay; discuss their conclusions with one another.

--obtain the balance and items to weigh from the supply table.

MATERIALS	TEACHING STRATEGIES

Continue to work with groups or individual students until you are satisfied that they can operate the balance properly. See that each student has an opportunity to weigh things and that one person does not dominate a group.

When students are able to use the balance and have finished experimenting, do the following demonstration. Do not continue with the demonstration unless there is adequate time to complete this part of the activity.

Take a teaspoon of clay (the size used in Part 2) and roll it in your hands to the shape of a ball. Weigh it and have a student tell you its weight and write the weight on the chalkboard.

In full view of the students, break the piece of clay into two equal pieces and roll one piece into a ball. Roll the other piece into a long cylinder, like a hotdog.

Then ask:

> IF WE PUT BOTH PIECES OF CLAY ON THE BALANCE, WILL THEY WEIGH MORE, LESS, OR THE SAME AS THE BALL OF CLAY WE JUST WEIGHED?

GIVE SE
STUDENTS
TO RES

TEACHING STRATEGIES

k with groups or individual students
atisfied that they can operate the
y. See that each student has an
veigh things and that one person does
group.

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nenting, do the following demonstration.
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complete this part of the activity.

of clay (the size used in Part I), and
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alkboard.

the students, break the piece of clay
ieces and roll one piece into a ball.
iece into a long cylinder, like a

OTH PIECES OF CLAY ON THE BALANCE,
EIGH MORE, LESS, OR THE SAME AS THE
Y WE JUST WEIGHED?

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

ANTICIPATED STUDENT BEHAVIORS

Students should:

--work in groups as they practice weighing things.

--make guesses of more, less, or the same.

MATERIALS

TEACHING STRATEGIES

Now put both pieces of clay on the balance and weigh them. Ask students to compare the weight of the two pieces with the previously weighed ball of clay.

Have students return to their work teams with instructions to weigh many different shapes and sizes made from the balls of clay, being sure to use all of the clay each time.

After adequate time to experiment has elapsed, draw the class together to share their results.

Ask:

WHAT IS ONE SHAPE THAT YOUR TEAM TRIED?

HOW MUCH DID IT WEIGH?

WAS THIS THE SAME WEIGHT AS THE PIECE
YOU STARTED WITH?

Elicit several responses from each group and write thei responses on the chalkboard as to the shape of the clay and the weight in beads. Be careful not to force any conclusions from the data.

Then ask:

WHAT DID YOU FIND OUT FROM DOING THIS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
pieces of clay on the balance and weigh tudents to compare the weight of the two he previously weighed ball of clay.	--observe that the weights are the same.
return to their work teams with to weigh many different shapes and sizes balls of clay, being sure to use all of time.	--weigh the clay using various shapes and sizes.
e time to experiment has elapsed, draw the r to share their results.	
ONE SHAPE THAT YOUR TEAM TRIED?	--respond with one shape of clay that their team weighed.
DID IT WEIGH?	--respond with the weight of the clay.
THE SAME WEIGHT AS THE PIECE TED WITH?	--compare weights and respond, "Yes."
l responses from each group and write their the chalkboard as to the shape of the clay t in beads. Be careful not to force any rom the data.	
YOU FIND OUT FROM DOING THIS?	--offer a variety of responses, including the idea that changing the shape or size of the clay did not change its weight.

ACCEPT ALL ANSWERS

MATERIALS

TEACHING STRATEGIES

Have students return equipment to the supply table.

Scoring and Recording Results

Forms for recording responses to Worksheet 5-1 are provided in the Background and Development Section of the Student Record of Progress in the front of this Guide. Also make the appropriate recording on Tallysheet 5-1 and send it in to BSCS.

Before teaching this activity, rate your students on their ability to follow directions. Use the guidelines and form provided on the Progress in Following Directions page of the Background and Development Section. Your initial impressions of student abilities will supplement the "following directions score" on the worksheet. Comparing the two, you can decide which children to monitor and support most closely to help them be more successful with the activities.

To obtain a score for following directions from Worksheet 5-1, allow one point for each of the following:

1. Printed first and last name.
2. Date copied as shown on the chalkboard.
3. One choice marked with an X for each item.
4. Age written on the bottom of the worksheet.
5. Last name only printed in the space on Side B of the worksheet.

eturn equipment to the supply table.

ording Results

ding responses to Worksheet 5-1 are
Background and Development Section of
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llow one point for each of the

rst and last name.

ed as shown on the chalkboard.

marked with an X for each item.

n on the bottom of the worksheet.

only printed in the space on Side B
ksheet.

MATERIALS

TEACHING STRATEGIES

Record the total score in the column provided on the page labeled Progress in Following Directions in the Student Record of Progress.

Next score the two items on Worksheet 5-1 and record th score in the column provided on the Student Developmen in Reasoning page.

These two items indicate whether a child has had sufficient experiences to realize that the quantity of something remains the same when its shape is changed, the ability to conserve quantity.

To score a student as having the ability to conserve quantity, he must answer both items correctly, marking Item 1, "They both have the same amount," and in Item "The beaker with the same level"(B).

Children who can't conserve may reason that the level the test tube is higher and so it must have more. Giv a choice of which they would like to drink, they would choose the test tube. Similarly they may reason that when the clay is broken into pieces, there is more and it will cause the water to rise higher. Do not expect this one experience to change the child's thinking process. He will need time and many experiences with things to develop the ability to reason logically and in abstract terms.

TEACHING STRATEGIES

al score in the column provided on the rogress in Following Directions in the l of Progress

two items on Worksheet 5-1 and record the olumn provided on the Student Development age.

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dent as having the ability to conserve ust answer both items correctly, marking both have the same amount," and in Item 2, th the same level"(B).

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ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have participated in following directions.*
- *--have learned at least temporarily which is their right hand.*
- *--have responded to Worksheet 5-1.*
- *--have observed the appearance of the soft drink in different sized and shaped containers.*
- *--have experimented with clay in water.*
- *--have practiced using the equal-arm balance.*
- *--have worked as a member of a team.*

UNIT V, CORE A
ACTIVITY 5-2

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How much time was necessary until you felt all students were competent in the use of the balance?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How much time was necessary until you felt all students were competent in the use of the balance?

13. Did the students work effectively in teams? ☐ Yes ☐ No

14. Complete and send Tallysheet 5-1 to BSCS.

Side A

UNIT V, CORE A
ACTIVITY 5-2

Teacher ________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.

Core A Objectives for the Student:

2. Develop a quantitative view of the needs for water.

ENVIRONMENTAL THEME:

Diversity and Patterns

INQUIRY SKILLS:

Associating

PROBLEM-SOLVING SKILLS:

Recording Data

PRACTICAL APPLICATION:

Learning about the Makeup of His Body,
Using a Scale or Balance

Activity 5-3. Living Things Are Mostly Water

The first part of this activity will serve to emphasize the proportional water content of the student's own body and his need for water. The second part of the activity will show that the food he eats also has a high water content.

ACTIVITY

Goals for the Student:
1. Understand the need for water.

2. Recognize the sources of water.

A Objectives for the Student:
2. Develop a quantitative view of the needs for water.

NTAL THEME:
rsity and Patterns

KILLS:
ciating

OLVING SKILLS:
rding Data

APPLICATION:
ning about the Makeup of His Body,
g a Scale or Balance

Living Things Are Mostly Water

of this activity will serve to emphasize al water content of the student's own eed for water. The second part of the show that the food he eats also has a tent.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. NEED FOR WATER

ACTIVITY 5-3. LIVING THINGS ARE MOSTLY WATER

During this activity, each student should:

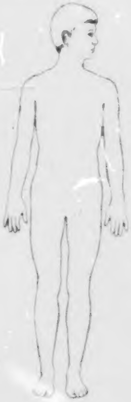
- *--guess how much of the human body is water.*
- *--determine whether the water content was more or less than one-half the weight of the item.*
- *--conclude that plants are made up of a great deal of water.*
- *--conclude that the human body consists of a great deal of water.*
- *--handle and slice some fresh fruits and vegetables.*

ACTIVITY
5-3

MATERIALS

*35 mm Slide projector
Equal-arm balance kits
Slides 5-1 through 5-3
Worksheet 5-2
*Knife and cutting board
*Paper muffin cups
*Oven
*Fresh fruits and vegetables of your choice:
- Lettuce
- Apple
- Carrots
- Potato
- Orange

Slide 5-1



*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

This activity will involve the use of the equal-arm balance. (Review Activity 3-11.) Samples of fruits and vegetables will be weighed, dried, and weighed agai Drying will require the use of an oven. If no oven is available in the school, provision should be made to transport the samples (in the paper cups) to and from a home oven.

Begin by saying:

WHAT DO YOU NEED TO STAY ALIVE?

Project Slide 5-1 on the chalkboard and ask:

HOW MUCH OF YOUR BODY IS MADE OF WATER?

Allow several students to come to the chalkboard and draw a line on the body outline to show how much of the body they think is composed of water.

TEACHING STRATEGIES

ration:

will involve the use of the equal-arm
iew Activity 3-11.) Samples of fruits
will be weighed, dried, and weighed again.
quire the use of an oven. If no oven is
he school, provision should be made to
samples (in the paper cups) to and from a

g:

OU NEED TO STAY ALIVE?

5-1 on the chalkboard and ask:

OF YOUR BODY IS MADE OF WATER?

students to come to the chalkboard and
the body outline to show how much of
think is composed of water.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- -*weigh a sample of the sliced material on the equal-arm balance and record the weight accurately.*
- -*observe that there is a significant weight loss in fresh plant material after oven-drying.*
- -*determine that this weight loss is due to the removal of water content.*
- -*calculate the weight loss of each food sample weighed and record it.*

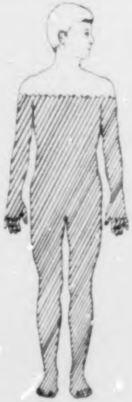
Students should:

--recall that they need air, food, water, light, friends, and so on.

--guess how much of the body is composed of water.

MATERIALS

Slide 5-2



TEACHING STRATEGIES

Then project Slide 5-2.

Ask:

WERE ANY OF YOUR GUESSES CLOSE?

HOW MUCH OF OUR BODY IS MADE UP OF WATER?

IF YOU ARE MADE OF THIS MUCH WATER, HOW MUCH OF OTHER LIVING THINGS IS WATER?

DO THE FRUITS AND VEGETABLES YOU EAT HAVE WATER IN THEM?

HOW COULD WE FIND OUT?

HERE IS ONE WAY WE COULD FIND OUT.

Have students work in groups of four.

DISTRIBUT

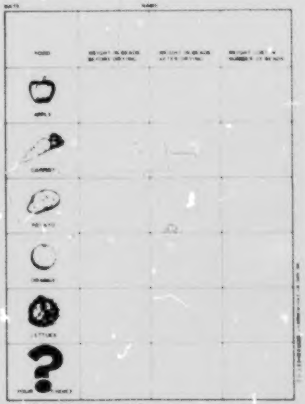
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ide 5-2.	
F YOUR GUESSES CLOSE?	--look at the lines drawn on Slide 5-1 and indicate whether any of the students' guesses were close.
F OUR BODY IS MADE UP OF WATER?	--conclude that a human body is composed of a large amount of water.
MADE OF THIS MUCH WATER, HOW HER LIVING THINGS IS WATER?	--respond, "A lot," "Not as much," "Quite a bit."
ITS AND VEGETABLES YOU EAT HAVE HEM?	--respond, "Yes," "They should," "I don't know."
WE FIND OUT?	--suggest ways to find out how much water is in fruits and vegetables.
E WAY WE COULD FIND OUT.	
ork in groups of four.	

DISTRIBUTE MATERIALS

ACTIVITY
5-3

MATERIALS

Worksheet 5-2



TEACHING STRATEGIES

Demonstrate this procedure and then direct students t

1. Label the paper muffin cups with their initials.
2. Place one paper muffin cup on each pan of the balance.
3. Count out 100 beads and place them in the cup on the right-hand side of the balance.
4. Carefully slice their sample material.
5. Place a quantity of the sliced sample in the left-hand cup.
6. Record the number of beads each food sample weighed (100) under the column that says "Weight in beads before" on Worksheet 5-2.

DE

After you have demonstrated the procedure, ask:

HOW WILL WE KNOW WHEN THE FOOD WEIGHS AS MUCH AS THE 100 BEADS?

This procedure should be repeated for each food sample used.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
his procedure and then direct students to:	
he paper muffin cups with their initials.	--label the cups with their initials.
ne paper muffin cup on each pan of ance.	--place the paper muffin cups on the balance pans.
ut 100 beads and place them in the cup right-hand side of the balance.	--count out 100 beads.
ly slice their sample material.	--cut fruit or vegetable samples into thin slices.
quantity of the sliced sample in the nd cup.	--measure sample as accurately as possible.
the number of beads each food sample (100) under the column that says in beads before" on Worksheet 5-2.	
demonstrated the procedure, ask:	
WE KNOW WHEN THE FOOD WEIGHS AS HE 100 BEADS?	--recall other experiences they have had using the balance and respond, "When they balance," "When one side doesn't go up or down," "When they stop moving."
should be repeated for each food	

DEMONSTRATE

MATERIALS

TEACHING STRATEGIES

When the food samples have been properly weighed and recorded, collect the paper cups containing the food samples and Worksheet 5-2. The samples should now be arranged carefully for transport to an oven. Dry the food samples overnight in an oven set at about 150° Fahrenheit, or the lowest temperature on the oven.

Ask:

> WHY DO YOU THINK WE ARE PUTTING THE FOOD SAMPLES IN AN OVEN?

Explain to the students that the food samples will now be put in an oven to dry up the water that is in them.

D

The next day distribute the paper cups containing the dried samples.

Ask:

> WHAT DO YOUR FOOD SAMPLES LOOK LIKE?
>
> WHY DID WE PUT THEM IN AN OVEN?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:

WORK TIME

amples have been properly weighed and ct the paper cups containing the food ksheet 5-2. The samples should now be ily for transport to an oven. Dry the ernight in an oven set at about 150° the lowest temperature on the oven.	
THINK WE ARE PUTTING THE FOOD AN OVEN?	--suggest such reasons as, "To dry them out," "To cook them," "To heat them up," and so forth.
students that the food samples will now en to dry up the water that is in them.	

DRYING
TIME

stribute the paper cups containing the	
UR FOOD SAMPLES LOOK LIKE?	--respond, "Shriveled up," "Wrinkly."
PUT THEM IN AN OVEN?	--respond, "To dry the water up," "To take the water out."

MATERIALS

TEACHING STRATEGIES

IF THE WATER IN THE FOOD WAS DRIED UP BY THE OVEN, WHAT SHOULD HAPPEN TO THE WEIGHT OF THE FOOD?

HOW COULD WE FIND OUT WHETHER OR NOT OUR FOOD SAMPLES LOST ANY WEIGHT?

Distribute Worksheet 5-2 and the balance kits. Direc
the students to work in the same groups as the day before.

Explain that the samples will again be weighed by determining how many beads are required to balance th
dried sample. This time students will record the num
of beads needed in the column on Worksheet 5-2 that i
headed, "Weight in beads after."

When all of the dried samples have been weighed and the weight recorded, ask:

WHAT HAPPENED TO THE WEIGHT OF THE FOOD SAMPLES?

THESE FOODS FEEL DRY NOW BUT THEY WERE MOIST YESTERDAY. WHY DO YOU THINK THEY WEIGH LESS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
TER IN THE FOOD WAS DRIED UP BY , WHAT SHOULD HAPPEN TO THE WEIGHT OD?	--predict the weight of the food samples to be less.
WE FIND OUT WHETHER OR NOT OUR LES LOST ANY WEIGHT?	--suggest using the balance.
ksheet 5-2 and the balance kits. Direct o work in the same groups as the day	
he samples will again be weighed by w many beads are required to balance the This time students will record the number d in the column on Worksheet 5-2 that is t in beads after."	

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
e dried samples have been weighed and orded, ask:	
ENED TO THE WEIGHT OF THE FOOD	--respond, "It is less," "They weigh less."
DS FEEL DRY NOW BUT THEY WERE MOIST . WHY DO YOU THINK THEY WEIGH LESS?	--associate the weight loss with the water loss and respond, "There isn't as much water in them."

MATERIALS

TEACHING STRATEGIES

DO DIFFERENT FOODS HAVE DIFFERENT AMOUNTS OF WATER IN THEM?

HOW DO WE KNOW?

Direct the students to calculate the weight loss of each food sample tested by looking at the two figures on Worksheet 5-2. They should subtract the number of beads it weighed after drying from the number of beads it originally weighed (100). Record this figure in the last column on Worksheet 5-2.

Do an example on the chalkboard and then instruct the students to begin their calculations.

DEMO

TEACHING STRATEGIES

NT FOODS HAVE DIFFERENT AMOUNTS OF
HEM?

KNOW?

ents to calculate the weight loss of each
ted by looking at the two figures on
They should subtract the number of beads
r drying from the number of beads it
hed (100). Record this figure in the
Worksheet 5-2.

n the chalkboard and then instruct the
in their calculations.

DEMONSTRATE

ANTICIPATED STUDENT BEHAVIORS

Students should:

--compare the weights listed on the chalkboard and infer, "Yes."

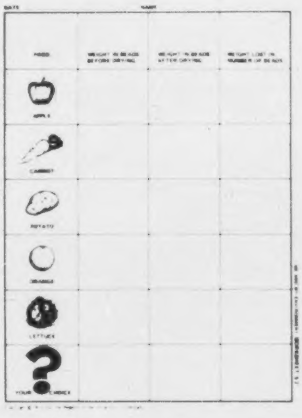
--respond, "Their weight was different," "They took different amounts of beads."

--calculate the weight change in each food sample.

ACTIVITY
5-3

MATERIALS

Slide 5-3



DATE NAME

FOOD	WEIGHT IN BEADS BEFORE DRYING	WEIGHT IN BEADS AFTER DRYING	WEIGHT LOST IN NUMBER OF BEADS
APPLE			
CARROT			
POTATO			
ORANGE			
LETTUCE			
YOUR CHOICE			

TEACHING STRATEGIES

To assist the students in visualizing the proportion of weight loss, ask:

> IF OUR FOOD WEIGHED 100 BEADS TO BEGIN WITH, HOW MANY BEADS WOULD IT WEIGH IF ONE-HALF OF THE WEIGHT WAS WATER AND WENT AWAY IN THE OVEN?

GIVE
TIM
TO
THIN

> IF YOUR FOOD SAMPLE LOST MORE THAN FIFTY BEADS IN WEIGHT WHEN IT DRIED OUT, THEN MORE THAN ONE-HALF OF THE FOOD CONSISTED OF WATER.

> IF YOUR FOOD SAMPLE LOST LESS THAN FIFTY BEADS IN WEIGHT WHEN IT DRIED OUT, THEN LESS THAN ONE-HALF OF THE FOOD WAS WATER.

Clue to Success:

Tell the students to put an X on those foods pictured on the worksheet that are made up of more than one-half water.

Collect the worksheets to look over later.

Project Slide 5-3 of Worksheet 5-2 and ask:

> WHICH FOODS WERE MADE UP OF MORE THAN ONE-HALF WATER?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
students in visualizing the proportion of ask:	Students should:
OCD WEIGHED 100 BEADS TO BEGIN WITH, BEADS WOULD IT WEIGH IF ONE-HALF OF HT WAS WATER AND WENT AWAY IN THE OVEN?	--guess how much a dried food sample would weigh if one-half of its original weight was water.
FOOD SAMPLE LOST MORE THAN FIFTY BEADS T WHEN IT DRIED OUT, THEN MORE THAN OF THE FOOD CONSISTED OF WATER.	
FOOD SAMPLE LOST LESS THAN FIFTY BEADS T WHEN IT DRIED OUT, THEN LESS THAN OF THE FOOD WAS WATER.	
ss:	
ents to put an X on those foods pictured eet that are made up of more than one-half	--put an X on those foods that are composed of more than one-half water (probably all of them).
orksheets to look over later.	
5-3 of Worksheet 5-2 and ask:	
ODS WERE MADE UP OF MORE THAN WATER?	--probably respond with the names of all the foods tested.

GIVE STUDENTS
TIME
TO
THINK

MATERIALS	TEACHING STRATEGIES
	WERE THERE ANY FOODS THAT WERE MADE UP OF <ins>LESS</ins> THAN ONE-HALF WATER? HOW MUCH WATER IS IN MOST FRUITS AND VEGETABLES? IS A PERSON MADE UP OF MORE WATER IN PROPORTION TO HIS SIZE THAN A PLANT? LESS? ABOUT THE SAME? If, after looking at the students' worksheets, you notice that any student did not mark all the fruits as being composed of more than one-half water, review with that student before continuing. Turn to the Numbers and Measurements page in the <ins>Student Record of Progress</ins> and find the column marked Activity 5-3, Weighing. Circle YES for each student who was able to use the balance without great difficulty. Find the column marked Activity 5-3, Calculating Weight Loss. Circle YES for each student who was able to calculate the weight loss without help. All students should be given a variety of opportunities to weigh and calculate.

TEACHING STRATEGIES

E ANY FOODS THAT WERE MADE UP OF
ONE-HALF WATER?

WATER IS IN MOST FRUITS AND
S?

ON MADE UP OF MORE WATER IN
N TO HIS SIZE THAN A PLANT?
OUT THE SAME?

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y student did not mark all the fruits as
of more than one-half water, review with
efore continuing.

nbers and Measurements page in the
of Progress and find the column marked
Weighing. Circle YES for each student
o use the balance without great difficulty.
n marked Activity 5-3, Calculating Weight
YES for each student who was able to
weight loss without help. All students
n a variety of opportunities to weigh

ANTICIPATED STUDENT BEHAVIORS

Students should:

--probably respond by saying that none of the foods were made up of less than one-half water.

--respond, "A lot," "Almost all," "More than one-half."

--conclude that since both are living things and that more than one-half of both is water, both are made up of about the same amount of water in proportion to size.

Upon completion of this activity, each student should, as a minimum:

--have weighed a piece of fruit or vegetable by using the balance.
--have observed that the fruit or vegetable weighed less after being in the oven.

ACTIVITY
5-3

MATERIALS

TEACHING STRATEGIES

See Change of Pacers 1 and 2.

TEACHING STRATEGIES

CHANGE OF PACER

Pacers 1 and 2.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have determined from the weight loss that there is a great deal of water in plants.

--have observed Slide 5-2 and concluded that the human body consists of a great deal of water.

UNIT V, CORE A
ACTIVITY 5-3

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How effective were the slides in communicating the concept of water content in the human body? Comments.

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How effective were the slides in communicating the concept of water content in the human body? Comments.

13. Send the student worksheets to BSCS.

14. Turn to the numbers and measurements page of the Student Record of Progress and record the students' ability to weigh food and calculate weight loss.

Side A

UNIT V, CORE A
ACTIVITY 5-3

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.

Core A Objectives for the Student:

1. Recognize the diversity of water uses in everyday life.

3. Recognize the universal importance of water for life.

ENVIRONMENTAL THEME:
Finiteness of Resources

INQUIRY SKILLS:
Comparing

PROBLEM-SOLVING SKILLS:
Discussion and Treatment of Group Data

PRACTICAL APPLICATION:
Working in a Group

Activity 5-4. Uses of Water

The beginning of this activity will focus the students' attention on water. The class will list and discuss the ways that water is used in daily life in the home, school, and community. Emphasis will be placed on the diversity of uses.

ACTIVITY

Goals for the Student:
1. Understand the need for water.

A Objectives for the Student:
1. Recognize the diversity of water uses in everyday life.

3. Recognize the universal importance of water for life.

NTAL THEME:
eness of Resources

ILLS:
ring

LVING SKILLS:
ssion and Treatment of Group Data

APPLICATION:
ng in a Group

Uses of Water

f this activity will focus the students'
ter. The class will list and discuss
ater is used in daily life in the home,
munity. Emphasis will be placed on the
es.

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. NEED FOR WATER

ACTIVITY 5-4. USES OF WATER

BSCS

During this activity, each student should:

--observe and discuss Slides 5-4 through 5-9.
--suggest a way that water is used.
--become a member of a group and discuss water uses in a particular place.
--write a water use on a three-by-five card.

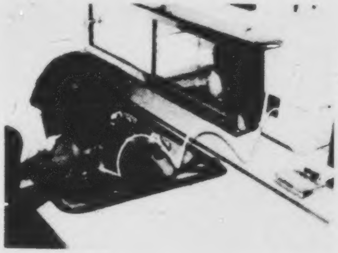
ACTIVITY
5-4

MATERIALS

Slides 5-4 through 5-9
*35 mm Slide projector
*3 X 5 Index cards

Slide 5-4

Slide 5-5



*Not furnished in materials kit

TEACHING STRATEGIES

Begin by saying:

> WATER IS SOMETHING WE ALL KNOW ABOUT, BUT WHAT IS IT?
>
> WHERE DOES WATER COME FROM?
>
> WHY DO WE NEED WATER?
>
> DO HORSES, CATS, AND DOGS NEED WATER?
>
> WHAT WOULD HAPPEN IF WE COULD NOT GET ANY WATER?
>
> WHAT ARE SOME OF THE WAYS THAT WE USE WATER?

Project Slide 5-4 and ask:

> HOW IS WATER USED HERE?

Continue with this questioning for Slides 5-5, 5-6, 5-7 5-8, and 5-9. If at all possible the students (not the teacher) should describe what the water use is in each slide. An exception might be Slide 5-6 (irrigation sprinkler) or Slide 5-9 (hydroelectric power).

When all the slides have been discussed, divide the class into three groups and have each group appoint one member to record ideas.

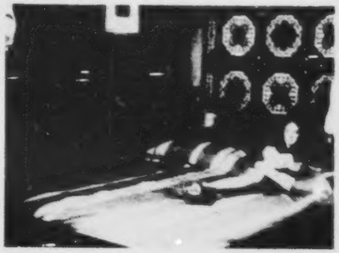
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ng:	
SOMETHING WE ALL KNOW ABOUT, BUT IT?	--respond, "Stuff you drink," "Liquid," "Something you use to wash," and so forth.
ES WATER COME FROM?	--reply, "From the faucet," "From a river," "From a lake," and so forth.
E NEED WATER?	--recall activities in previous units on life needs and reply, "To live," "To keep clean," "To drink," "To work."
S, CATS, AND DOGS NEED WATER?	--respond, "Yes."
LD HAPPEN IF WE COULD NOT GET R?	--respond, "We'd get thirsty," "Things would dry up," "Lots of things would die," and so forth.
SOME OF THE WAYS THAT WE USE WATER?	--speculate on the variety of ways that water is used.
5-4 and ask:	
ATER USED HERE?	--respond, "To wash the streets."
this questioning for Slides 5-5, 5-6, 5-7, If at all possible the students (not the d describe what the water use is in each eption might be Slide 5-6 (irrigation Slide 5-9 (hydroelectric power).	--describe the water use pictured in each slide.
lides have been discussed, divide the ee groups and have each group appoint one rd ideas.	

MATERIALS

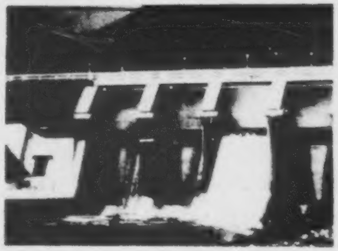
Slide 5-6

Slide 5-7

Slide 5-8



Slide 5-9



TEACHING STRATEGIES

Then say:

> BEGIN THINKING OF THE MANY WAYS THAT WE USE WATER. EACH GROUP WILL BE THINKING ABOUT WATER USES IN ONE CERTAIN PLACE. ONE GROUP WILL THINK OF WAYS WE USE WATER AT HOME. ONE GROUP WILL THINK OF WAYS WE USE WATER AT SCHOOL. ONE GROUP WILL THINK OF WAYS WE USE WATER IN PLACES OTHER THAN AT HOME OR AT SCHOOL. HAVE ONE PERSON IN YOUR GROUP WRITE THESE IDEAS DOWN AS YOU THINK OF THEM.

Assign each group a place where water is used and begin.

Assist the student recorders with spelling as needed.

When the lists have been compiled, have each group present to the class the ways they thought water was used in the area assigned to them. As they are reporting, make a heading of that area (home, school, or other places) on the chalkboard and list the suggestions made by each group beneath the heading. (See the list of suggested uses.)

After each group has reported to the class their suggestions and you have recorded them on the chalkboard, ask:

> CAN ANYONE ELSE IN THE CLASS THINK OF OTHER WAYS THAT WATER MIGHT BE USED IN (home, school, or other places)?

TEACHING STRATEGIES

NKING OF THE MANY WAYS THAT WE USE
ACH GROUP WILL BE THINKING ABOUT
S IN ONE CERTAIN PLACE. ONE GROUP
K OF WAYS WE USE WATER AT HOME. ONE
L THINK OF WAYS WE USE WATER AT SCHOOL.
WILL THINK OF WAYS WE USE WATER IN
HER THAN AT HOME OR AT SCHOOL. HAVE
N IN YOUR GROUP WRITE THESE IDEAS
OU THINK OF THEM.

oup a place where water is used and begin.

dent recorders with spelling as needed.

have been compiled, have each group
class the ways they thought water was
a assigned to them. As they are
a heading of that area (home, school,
) on the chalkboard and list the
e by each group beneath the heading.
f suggested uses.)

p has reported to the class their
you have recorded them on the
:

ELSE IN THE CLASS THINK OF OTHER
WATER MIGHT BE USED IN (home, school,
laces)?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--participate in the group endeavor and offer suggestions.

--suggest other ways water might be used.

MATERIALS

SOME COMMON WATER USES

HOME

Dishes
Cooking
Drinking
Bathing
Washing clothes
Mopping floors — Cleaning
Cleaning sink
Brushing teeth
Shaving
Watering lawn
Washing cars
Watering plants
Toilet flush
Heat (some)
Car--washers, radiator
Irrigation water for animals
Water for pets

SCHOOL

Drinking
Cleaning
Cooking
Dishes — Food service, Home ec.
Flush toilet
Bathing (gym)
Science
Heat (some)

OTHER PLACES

Fireman--hoses
Fire hydrants
Water treatment
Sewer
Street cleaners
Heating buildings
Cleaning buildings
Parks, lawns, lakes

TEACHING STRATEGIES

Expect to have certain uses mentioned in more than one area. When the entire list is complete, ask:

> DO WE USE WATER VERY MUCH?
>
> WHEN DO WE USE WATER?
>
> WHERE DO WE USE WATER?
>
> IS WATER SOMETIMES USED THE SAME WAY IN HOME, SCHOOL, OR TOWN?
>
> LET'S MAKE A LIST OF THE WAYS WE USE WATER. WE CAN DO THIS BY LOOKING AT OUR LIST ON THE CHALKBOARD AND ERASING ALL BUT ONE OF THOSE THAT ARE LISTED MORE THAN ONCE.

When the duplicates have been erased, distribute severa three-by-five-inch index cards to each group. Using th list on the chalkboard, members of the groups should label each card with one way that we use water. There should be only one water use on each card. (If there a twenty-five water uses on the chalkboard, then each grou should have twenty-five cards.) Encourage students to print in neat, rather large letters so the cards will be easy to read. Suggest that each student do several cards so that all members of the group are participatin These cards will be used in the next activity when students will assign priorities to the water uses.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ASK FOR OTHER IDEAS	
e certain uses mentioned in more than one he entire list is complete, ask:	
E WATER VERY MUCH?	--examine the long list and conclude, "Yes."
WE USE WATER?	--respond by examining the lists on the chalkboard and saying, "All the time."
WE USE WATER?	--respond, "All over," "Everywhere."
SOMETIMES USED THE SAME WAY IN HOOL, OR TOWN?	--compare the lists and respond, "Yes," and mention those duplicated uses such as drinking, cooking, and washing.
KE A LIST OF THE WAYS WE USE WATER. D THIS BY LOOKING AT OUR LIST ON KBOARD AND ERASING ALL BUT ONE OF AT ARE LISTED MORE THAN ONCE.	--take turns erasing the duplicate water uses.
icates have been erased, distribute several -inch index cards to each group. Using the halkboard, members of the groups should d with one way that we use water. There one water use on each card. (If there are ter uses on the chalkboard, then each group enty-five cards.) Encourage students to rather large letters so the cards will be Suggest that each student do several all members of the group are participating. ll be used in the next activity when assign priorities to the water uses.	

MATERIALS

TEACHING STRATEGIES

Leave the list of water uses on the chalkboard for the next activity.

After students have labeled the cards, have them put a rubber band around them and their names on the outside card. Collect the cards and save them for use in Activity 5-5.

CHANGE

See Change of Pacer 3.

TEACHING STRATEGIES

f water uses on the chalkboard for the

WORK TIME

ave labeled the cards, have them put a nd them and their names on the outside he cards and save them for use in

CHANGE OF PACER

er 3.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--be able to suggest one way that water is used.*
- *--have recorded one water use on a three-by-five card.*
- *--have participated in a group activity.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE A
ACTIVITY 5-4

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes preparing for each day's science class						
4. Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Comment about the slides used in the activity.

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Comment about the slides used in the activity.

13. How productive were the small groups in generating ideas about water uses?

Side A

UNIT V, CORE A
ACTIVITY 5-4

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student

1. Understand the need for water.

6. Understand the broad problems of water management.

Core A Objectives for the Student:

1. Recognize the diversity of water uses in everyday life.

ENVIRONMENTAL THEME:

Finiteness of Resources

INQUIRY SKILLS:

Associating

PROBLEM-SOLVING SKILLS:

Organizing Data

PRACTICAL APPLICATION:

Making Up One's Mind about a Subject and Defending the Decision to Someone, Working in a Group, Using Pictorial Clues to Solve a Problem

Activity 5-5. Priorities of Water Use

This activity will serve to develop the idea that some uses of water are more important than others. Using the list of water uses developed in Activity 5-4, the students will put them in their order of importance.

ACTIVITY

Goals for the Student
1. Understand the need for water.

6. Understand the broad problems of water management.

A Objectives for the Student:
1. Recognize the diversity of water uses in everyday life.

NTAL THEME:
eness of Resources

KILLS:
iating

LVING SKILLS:
nizing Data

APPLICATION:
ng Up One's Mind about a Subject and
nding the Decision to Someone, Working
Group, Using Pictorial Clues to Solve
blem

Priorities of Water Use

ill serve to develop the idea that some
re more important than others. Using
er uses developed in Activity 5-4, the
ut them in their order of importance.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. USES OF WATER

ACTIVITY 5-5. PRIORITIES OF WATER USE

During this activity, each student should:

- *--participate as a member of a group in putting the water use cards in their order of importance, as agreed upon by individuals in the group.*
- *--assist as a member of a group in pinning the ordered water use cards on a bulletin board.*

ACTIVITY
5-5

MATERIALS

Worksheet 5-3
*3 X 5 Index cards (from
Activity 5-4)
*Bulletin board
*Pins
*Scissors
*Tape
*Lined 8 1/2-X-11-inch paper

*Not furnished in materials kit

TEACHING STRATEGIES

Water priorities should be arrived at by the student groups and not be imposed by the teacher. A Clue to Success concludes this activity. The Clue to Success will help to assess the students' understanding of water uses as well as their ability to group.

Begin by dividing the class into the same groups they were in for Activity 5-4. While the students are getting into their groups, distribute the three-by-five cards made in Activity 5-4.

Review the water uses by asking:

> WHAT WERE THE WATER USES SHOWN IN THE SLIDES WE SAW YESTERDAY?

> WHAT WERE THE WATER USES YOUR GROUPS THOUGHT OF YESTERDAY?

TEACHING STRATEGIES

ies should be arrived at by the student t be imposed by the teacher. A Clue to udes this activity. The Clue to Success assess the students' understanding of well as their ability to group.

ding the class into the same groups they ctivity 5-4. While the students are their groups, distribute the three-by-five Activity 5-4.

ter uses by asking:

E THE WATER USES SHOWN IN THE E SAW YESTERDAY?

E THE WATER USES YOUR GROUPS OF YESTERDAY?

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--be able to explain and defend why the water use cards were put in that order.*
- *--choose two or three water uses that appear high on each priority list.*
- *--realize that his personal uses of water, such as drinking, cooking, and washing are most important to him.*
- *--realize that other water uses make life easier for him but aren't absolutely essential to life.*
- *--cut and group the pictures on Worksheet 5-3.*
- *--fit the pieces of Worksheet 5-3 together to make a picture.*
- *--name and discuss the three new groups on Worksheet 5-3.*

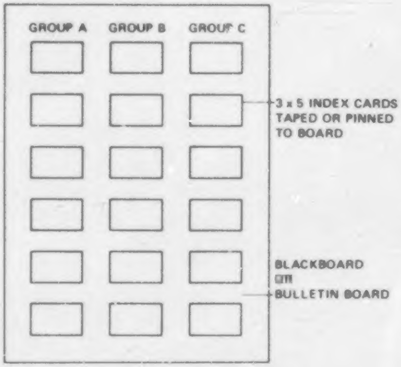
Students should:

--recall the water uses shown in Slides 5-4 through 5-9.

--recall Activity 5-4 and respond, "Drinking," "Washing clothes," "Washing cars," and so forth.

MATERIALS

Diagram 5-1


GROUP A
GROUP B
GROUP C
3 x 5 INDEX CARDS TAPED OR PINNED TO BOARD
BLACKBOARD OR BULLETIN BOARD

TEACHING STRATEGIES

After most of the water uses from Activity 5-4 have been mentioned, say:

> TODAY YOU ARE GOING TO TRY TO DECIDE WHICH WATER USES ARE MOST IMPORTANT TO YOU, WHICH ARE NEXT MOST IMPORTANT TO YOU, AND SO ON. USE THE CARDS THAT YOU MADE YESTERDAY. WHEN MEMBERS OF YOUR GROUP DECIDE WHICH WATER USE IS MOST IMPORTANT TO THEM, PUT THAT CARD ON THE TOP OF YOUR DESK OR TABLE. PUT THE CARD WITH THE WATER USE THAT IS NEXT MOST IMPORTANT TO MEMBERS OF THE GROUP UNDERNEATH THE FIRST CARD. CONTINUE TO DO THIS UNTIL ALL THE CARDS ARE LINED UP. REMEMBER, THE MOST IMPORTANT WATER USE WILL BE AT THE TOP AND THE LEAST IMPORTANT WILL BE AT THE BOTTOM. ANY QUESTIONS?

When each of the three groups has finished putting the cards in order of priority, choose a bulletin board that will have enough room for the groups to pin up their ordered cards. (See Diagram 5-1.)

TEACHING STRATEGIES

the water uses from Activity 5-4 have
, say:

ARE GOING TO TRY TO DECIDE WHICH
S ARE MOST IMPORTANT TO YOU, WHICH
MOST IMPORTANT TO YOU, AND SO ON.
ARDS THAT YOU MADE YESTERDAY. WHEN
F YOUR GROUP DECIDE WHICH WATER USE
MPORTANT TO THEM, PUT THAT CARD ON
F YOUR DESK OR TABLE. PUT THE CARD
WATER USE THAT IS NEXT MOST
TO MEMBERS OF THE GROUP UNDERNEATH
CARD. CONTINUE TO DO THIS UNTIL
ARDS ARE LINED UP. REMEMBER, THE
RTANT WATER USE WILL BE AT THE TOP
EAST IMPORTANT WILL BE AT THE
ANY QUESTIONS?

he three groups has finished putting the
of priority, choose a bulletin board
enough room for the groups to pin up
cards. (See Diagram 5-1.)

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond with any questions they might have.
--arrange their cards in order of priority.

MATERIALS

TEACHING STRATEGIES

Say:

> NOW THAT YOU HAVE YOUR CARDS IN THE ORDER YOU WANT, PIN THEM TO THE BULLETIN BOARD IN THAT SAME ORDER AND EXPLAIN WHY YOU PUT THEM IN THAT ORDER. THEN WE WILL BE ABLE TO COMPARE THE LISTS.

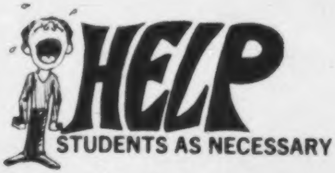
Even though some lists may seem to be in an unusual order, accept them as long as the students have a logical explanation for why they placed the cards in that order.

When all the groups have displayed their water use cards on the bulletin board and have explained why they put them in that order, draw their attention to which uses are at the top of the lists and which uses are at the bottom by asking:

> DOES ANYONE SEE A WATER USE THAT APPEARS AT OR NEAR THE TOP OF ALL THREE LISTS?

Continue with this line of questioning until two or three uses (most likely personal uses such as drinking, washing, and cooking) emerge as being of more importance than others. List them on the chalkboard as they are discussed.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
YOU HAVE YOUR CARDS IN THE ORDER YOU THEM TO THE BULLETIN BOARD IN THAT R AND EXPLAIN WHY YOU PUT THEM IN R. THEN WE WILL BE ABLE TO COMPARE	--pin their water use cards on the bulletin board and explain the reason for ordering them in that way.
e lists may seem to be in an unusual hem as long as the students have a tion for why they placed the cards in	
oups have displayed their water use lletin board and have explained why they t order, draw their attention to which top of the lists and which uses are at sking:	
E SEE A WATER USE THAT APPEARS AT E TOP OF ALL THREE LISTS?	--compare the lists and respond with a use of water that is listed near the top of each one.
his line of questioning until two or t likely personal uses such as drinking, oking) emerge as being of more importance ist them on the chalkboard as they are	



MATERIALS

TEACHING STRATEGIES

Ask:

WHY ARE THESE WATER USES MOST IMPORTANT TO US?

> If students do not realize that these water uses are most important because they have to do with the person's well-being and daily grooming, say:
>
> WHO USES THE WATER IN THESE WAYS?

Continue by saying:

COULD WE DO WITHOUT THE WATER USES THAT ARE ON THE TOP OF THE LIST?

WHICH ONES COULD WE DO WITHOUT?

WHICH ONES COULD WE NOT DO WITHOUT?

WHAT ARE SOME OF THE WATER USES THAT ARE TOWARD THE BOTTOM OF OUR LISTS?

ACC
ANS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ACCEPT ALL ANSWERS	
SE WATER USES MOST IMPORTANT TO US?	--reply, "Because these are the ways we use water everyday," "We use water in these ways to keep alive," "Those are the uses we can't do without."
ts do not realize that these water most important because they have to he person's well-being and daily say:	
THE WATER IN THESE WAYS?	--reply, "I do," "Me," "Other people."
ng:	
WITHOUT THE WATER USES THAT ARE OF THE LIST?	--reply, "No," "We need them too much," "We need them to keep alive."
COULD WE DO WITHOUT?	--probably indicate those water uses not related to personal grooming or well-being.
COULD WE NOT DO WITHOUT?	--probably indicate those water uses related to personal grooming or well-being.
E OF THE WATER USES THAT ARE BOTTOM OF OUR LISTS?	--probably reply with uses such as watering lawns, washing cars, street cleaners, automatic dishwashers, fire protection, and other community uses.

ACTIVITY
5-5

MATERIALS

TEACHING STRATEGIES

WHY DO YOU THINK THOSE ARE LESS IMPORTANT TO US?

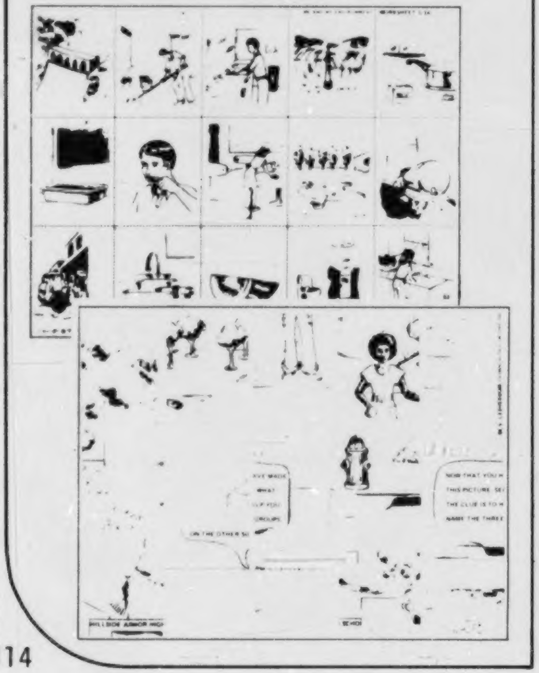
WHAT WOULD OUR LIVES BE LIKE WITHOUT THEM?

IF OUR LIVES ARE BETTER WHEN WE USE WATER IN ALL THESE WAYS, WHY DO WE CONSIDER SOME WAYS MORE IMPORTANT THAN OTHERS?

Accept any logical answers. The discussion should ultimately conclude that our lives are made easier by all the water uses, but some, such as drinking and washing, are very basic to our lives.

Clues to Success: Understanding

Worksheet 5-3



Distribute Worksheet 5-3 and a pair of scissors to each student.

TEACHING STRATEGIES

THINK THOSE ARE LESS IMPORTANT

OUR LIVES BE LIKE WITHOUT THEM?

ES ARE BETTER WHEN WE USE WATER
SE WAYS, WHY DO WE CONSIDER SOME
IMPORTANT THAN OTHERS?

cal answers. The discussion should
lude that our lives are made easier by
ses, but some, such as drinking and
ry basic to our lives.

s: Understanding

CLUES TO SUCCESS

sheet 5-3 and a pair of scissors to

DISTRIBUTE MATERIALS

ANTICIPATED STUDENT BEHAVIORS

Students should:

--reply, "Because we don't absolutely need them," "We could do without them," "They're extras."

--reply, "Hard," "Messy," "We might get sick more often," "We wouldn't have as nice a place to live."

--suggest many reasons.

MATERIALS

TEACHING STRATEGIES

Now ask various students to identify and describe the pictures on Worksheet 5-3B.

HA
INV
ALL
STU

Then say:

> LOOK CAREFULLY AT ALL OF THE PICTURES OF WATER. THINK OF A WAY YOU CAN PUT THEM INTO TWO GROUPS. THEN CUT THE PICTURES APART ON THE DOTTED LINES AND PUT THEM IN THE GROUPS YOU THOUGHT OF. THERE ARE DIFFERENT WAYS THEY CAN BE GROUPED. THINK OF YOUR OWN IDEA. RAISE YOUR HAND WHEN YOU HAVE FINISHED.

As you circulate around the room, encourage any students that are having difficulty. If a student is unable to generate an idea for grouping, make a suggestion such as "water used for cleaning -- water not used for cleaning," or "uses of water most important -- least important to me." Write down the names of students unable to do the task independently so you can help them in subsequent activites. Record their names on Tallysheet 5-2 after class.

As a student finishes grouping, give him a sheet of lined paper to write down the names of the two groups. Be sure he writes his name on it. Then check to see if all the pictures in each of the groups are appropriate. Have students explain their grouping as necessary.

TEACHING STRATEGIES

students to identify and describe the
ksheet 5-3B.

HAVE YOU
INVOLVED
ALL
STUDENTS?

ULLY AT ALL OF THE PICTURES OF
INK OF A WAY YOU CAN PUT THEM
ROUPS. THEN CUT THE PICTURES
HE DOTTED LINES AND PUT THEM
UPS YOU THOUGHT OF. THERE
ENT WAYS THEY CAN BE GROUPED.
OUR OWN IDEA. RAISE YOUR HAND
AVE FINISHED.

e around the room, encourage any
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ts unable to do the task independently
them in subsequent activites. Record
Tallysheet 5-2 after class.

nishes grouping, give him a sheet of
write down the names of the two groups.
es his name on it. Then check to see
ures in each of the groups are
ave students explain their grouping as

ANTICIPATED STUDENT BEHAVIORS

Students should:

--observe, describe, and identify the pictures on Worksheet 5-3B.

--think of grouping ideas; cut, and sort the pictures into two groups.

--write down the group names on lined paper.

MATERIALS

Diagram 5-2

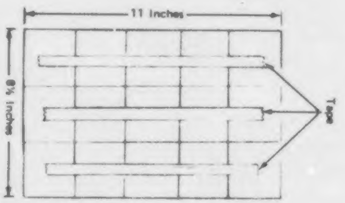

Diagram 5-2

TEACHING STRATEGIES

Remember that this is an assessment of the student's ability to group things. Do not teach grouping at this time.

When most students have completed grouping and writin the names of their groups, allow time for sharing the category names they have created.

Then say:

> NOW WE ARE GOING TO DO A DOUBLE PUZZLE. TURN THE PIECES OF YOUR TWO GROUPS OVER. IF YOU PUT THE PIECES THAT BELONG TOGETHER IN EACH GROUP, YOU WILL HAVE ONE BIG PICTURE. IT IS LIKE A JIGSAW PUZZLE. WHEN YOUR PICTURE IS COMPLETE, I WILL TAPE IT FOR YOU AND START YOU ON THE SECOND PUZZLE.

As students finish, tape each picture of Worksheet 5-3 as shown in Diagram 5-2. Then read the clue to each student and tell him to turn the picture over. Ask hi to decide the way the pictures have now been put into three groups and write the groups on the lined paper. Help with spelling as necessary. Record the names of students who need help or are unable to do the puzzle.

TEACHING STRATEGIES

t this is an assessment of the student's
roup things. Do not teach grouping at

udents have completed grouping and writing
their groups, allow time for sharing the
es they have created.

ARE GOING TO DO A DOUBLE PUZZLE. TURN
CES OF YOUR TWO GROUPS OVER. IF YOU
PIECES THAT BELONG TOGETHER IN EACH
YOU WILL HAVE ONE BIG PICTURE. IT IS
JIGSAW PUZZLE. WHEN YOUR PICTURE IS
E, I WILL TAPE IT FOR YOU AND START
THE SECOND PUZZLE.

finish, tape each picture of Worksheet 5-3A
Diagram 5-2. Then read the clue to each
tell him to turn the picture over. Ask him
way the pictures have now been put into
and write the groups on the lined paper.
lling as necessary. Record the names of
need help or are unable to do the puzzle.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--share the category names for the two groups they have made.

--put the puzzle together.

--use the clue and observe three groups of pictures: (1) brushing teeth, water in food, swimming pool, making Jell-O, washing dishes; (2) cleaning classroom floor, school drinking fountain, class pond, washing hands in school restroom; (3) street cleaning truck, waitress cleaning a table, hydroelectric dam, irrigation, sprinkler system, washing a fire truck; write the names for the groups on their lined paper.

ACTIVITY
5-5

MATERIALS

TEACHING STRATEGIES

This exercise assesses student understanding of the various uses of water, primarily in three ways: (1) informally assessed through initial observation, description, and naming of each picture; (2) the types of groups into which they sorted the pictures, and; (3) whether or not they were able to label appropriatel the three groups pictured on the worksheet. Review Activities 5-3, 5-4, and 5-5 as necessary with students who experienced difficulty with these aspects of the lesson. They will probably experience difficulty in subsequent activities on water if remedial help is not provided at this time. Give positive feedback to students who did well.

CHANG

See Change of Pacers 4 and 5.

TEACHING STRATEGIES

assesses student understanding of the of water, primarily in three ways: (1) sessed through initial observation, and naming of each picture; (2) the types o which they sorted the pictures, and; r not they were able to label appropriately ups pictured on the worksheet. Review 3, 5-4, and 5-5 as necessary with students ed difficulty with these aspects of the will probably experience difficulty in tivities on water if remedial help is not his time. Give positive feedback to did well.

CHANGE OF PACER

Pacers 4 and 5.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have suggested two or three ways in which water is most important to him.*
- *--have realized that personal water uses are more essential to his life than are other water uses.*
- *--have discussed the pictures on Worksheet 5-3.*
- *--have sorted the worksheet pictures into two groups.*
- *--have put the worksheet puzzle together.*

MATERIALS

TEACHING STRATEGIES

The three groups of five pictures each are:

My use of water

School use of water

Other uses of water

As several students finish, draw them into a group, and say:

WHO CAN TELL US ALL THE THINGS IN ONE OF THE GROUPS?

Repeat this strategy twice, and say:

WHO KNOWS HOW THE GROUPS WERE SORTED?

WHY DO YOU THINK THAT?

Interpretation and Scoring

Students may keep the worksheet but collect the lined paper with grouping names and record the information on Tallysheet 5-2 to send to BSCS. The tallysheet contains an explanation of how to score items and judge performance. It also explains how to enter the results in the Student Record of Progress.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
s of five pictures each are:	
water	
of water	
of water	
ents finish, draw them into a group.	
LL US ALL THE THINGS IN ONE UPS?	--respond with the five pictures in one of the groups.
ategy twice, and say:	
HOW THE GROUPS WERE SORTED?	--respond with various ideas.
THINK THAT?	--defend their group names.
and Scoring	
ep the worksheet but collect the lined ping names and record the information -2 to send to BSCS. The tallysheet lanation of how to score items and ce. It also explains how to enter the Student Record of Progress.	

UNIT V, CORE A
ACTIVITY 5-5

Teacher _______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO:	1/4	1/2	3/4	ALL
HIGH INTEREST						
MODERATE INTEREST OR INDIFFERENCE						
RESISTANCE OR DISLIKE						

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) _______________ Comment:

Specific Questions:

12. Would you rank the water use priorities the same way your students did?
☐ Yes ☐ No Comment:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

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☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Would you rank the water use priorities the same way your students did?
☐ Yes ☐ No Comment:

13. Send the sheets with grouping names to BSCS.

14. Complete and send Tallysheet 5-2 to BSCS.

UNIT V, CORE A
ACTIVITY 5-5

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Recognize the sources of water.

6. Understand the broad problems of water management.

Core A Objectives for the Student:

2. Develop a quantitative view of the needs for water.

ENVIRONMENTAL THEME:

Finiteness of Resources

INQUIRY SKILLS:

Comparing

PROBLEM-SOLVING SKILLS:

Recording and Organizing Data

PRACTICAL APPLICATION:

Measuring, Use of Charts and Records, Family Communication, Realization of Water Quantities Used

Activity 5-6. How Much Water Do I Use?

This activity will direct students to a quantitative view of their needs for water. Students will record and report the amount of water that they require each day for drinking, bathing, washing clothes, and so forth.

ACTIVITY

Goals for the Student:
2. Recognize the sources of water.

6. Understand the broad problems of water management.

A Objectives for the Student:
2. Develop a quantitative view of the needs for water.

NTAL THEME:
teness of Resources

KILLS:
aring

OLVING SKILLS:
rding and Organizing Data

APPLICATION:
uring, Use of Charts and Records,
ly Communication, Realization of
r Quantities Used

How Much Water Do I Use?

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BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE A. NEED FOR WATER

ACTIVITY 5-6. HOW MUCH WATER DO I USE?

During this activity, each student should:

--recall the diversity of water uses as discussed in Activities 5-4 and 5-5.
--develop a notion of the unit volume of one gallon.
--keep a detailed record of his personal and family use of water on Worksheet 5-4.

ACTIVITY
5-6

MATERIALS

Worksheet 5-4
Funnel
Measuring cup
*One gallon jug
*Water
*Toothbrush
*Toothpaste
*Pail or bucket
*Dishpan (if there is no sink in the classroom)

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Because the students may have difficulty with various units of measure, this activity will be based upon only one fundamental unit -- the U.S gallon. Amounts of water less than one gallon will be related to a measuring cup.

2. The day before this activity, ask one of your students to bring his toothbrush to class. Bring yours in case he forgets.

3. Refer to your ratings of students who had difficulty doing the calculations in Activity 5 (See the "Numbers and Measurements" page of the Student Record of Progress.) Provide additiona help for these students as they work with Worksheet 5-4.

4. Observe the amount of difficulty students have in completing Worksheet 5-4. After class, rate each student's success with these calculations in the Student Record of Progress. A column headed "Act. 5-6 Totals" on the "Numbers and Measurements" page is provided for this purpo

TEACHING STRATEGIES

ration:

the students may have difficulty with
units of measure, this activity will be
pon only one fundamental unit -- the U.S.
Amounts of water less than one gallon
related to a measuring cup.

before this activity, ask one of your
s to bring his toothbrush to class.
ours in case he forgets.

o your ratings of students who had
lty doing the calculations in Activity 5-3.
e "Numbers and Measurements" page of the
Record of Progress.) Provide additional
r these students as they work with
et 5-4.

the amount of difficulty students have
leting Worksheet 5-4. After class, rate
dent's success with these calculations
Student Record of Progress. A column
"Act. 5-6 Totals" on the "Numbers and
ments" page is provided for this purpose.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--participate in measuring how much water is required to brush teeth and fill a mop bucket.
--compute water use totals on Worksheet 5-4.
--conclude that it requires a great deal of water to conduct everyday activities.
--conclude that drinking water would be the last water use to be eliminated.
--suggest a number of ways to save water.

MATERIALS

TEACHING STRATEGIES

Begin by saying:

HOW MUCH WATER DO YOU THINK YOU DRINK IN ONE DAY?

ACCE
ANS

HOW MUCH WATER DO YOU THINK YOU NEED TO DRINK IN ONE DAY?

DOCTORS SAY WE SHOULD DRINK AT LEAST EIGHT GLASSES OF WATER EVERY DAY.

COULD YOU GET THIS AMOUNT OF WATER BY EATING OR DRINKING THINGS OTHER THAN PLAIN WATER?

WHAT ARE SOME OF THE THINGS YOU COULD EAT OR DRINK TO GET THE AMOUNT OF WATER YOU NEED?

> If students do not realize that most foods and beverages contain water, help them to recall Activity 5-3 by asking:
>
> WHEN WE WEIGHED AND DRIED FOODS A FEW DAYS AGO, WHAT DID WE FIND OUT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
:	
ATER DO YOU THINK YOU DRINK IN	--respond in terms of glasses, cups, quarts, or gallons; "None, I drink only milk or pop."
ACCEPT ALL ANSWERS	
ATER DO YOU THINK YOU NEED TO NE DAY?	--guess how much water is needed in one day.
Y WE SHOULD DRINK AT LEAST SES OF WATER EVERY DAY.	
GET THIS AMOUNT OF WATER BY DRINKING THINGS OTHER THAN R?	--respond, "Yes," "No," "Maybe."
OME OF THE THINGS YOU COULD EAT D GET THE AMOUNT OF WATER YOU NEED?	--suggest such things as soft drinks, ice cream, fruits, milk, and so forth.
ents do not realize that most foods erages contain water, help them to Activity 5-3 by asking:	
WEIGHED AND DRIED FOODS AYS AGO, WHAT DID WE FIND OUT?	--recall Activity 5-3 and respond, "The foods had a lot of water in them."

MATERIALS

TEACHING STRATEGIES

Then ask:

> HOW MUCH WATER DO YOU THINK YOU USE IN OTHER WAYS DURING ONE DAY?

If any students suggest they do not use water very muc be sure to recall or even review Activity 5-4 which established the diversity of water uses.

Then ask:

> HOW CAN WE FIND OUT JUST HOW MUCH WATER EACH OF US USES IN ONE DAY?

The amount of water each person uses daily is likely to exceed quantities measurable by the cup, so students should begin thinking in terms of gallons.

Hold up a one-cup measure and ask:

> HOW MUCH DOES THIS MEASURE?

Identify the measure as a one-cup measure.

Hold up a gallon jug and ask:

> HOW MUCH DOES THIS MEASURE?

Identify the jug as a gallon jug.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
WATER DO YOU THINK YOU USE IN YS DURING ONE DAY?	--respond, "None," "A little," "Some," "Many gallons."
ACCEPT ALL ANSWERS	
ts suggest they do not use water very much, call or even review Activity 5-4 which he diversity of water uses.	
WE FIND OUT JUST HOW MUCH WATER EACH ES IN ONE DAY?	--respond, "Count the cups," "Measure the water," "Keep a record," "Measure the gallons," etc.
water each person uses daily is likely ntities measurable by the cup, so ld begin thinking in terms of gallons.	
-cup measure and ask:	
DOES THIS MEASURE?	--respond, "One cup," "Not much."
easure as a one-cup measure.	
lon jug and ask:	
DOES THIS MEASURE?	--respond, "A lot," "A gallon," "A whole bunch."
jug as a gallon jug.	

MATERIALS

Worksheet 5-4

TEACHING STRATEGIES

HOW MANY CUPS DO YOU THINK WOULD BE IN A GALLON?

LET'S FIND OUT WHO'S RIGHT.

Select two students to fill a one-gallon container using a measuring cup and a funnel. This will establish that there are about sixteen cups in one gallon.

HOW COULD WE FIND OUT HOW MUCH WATER WE USE IN ONE DAY?

HOW COULD WE FIND OUT HOW MUCH WATER OUR FAMILY USES IN ONE DAY?

WE ARE GOING TO FIND OUT HOW MUCH WATER YOU AND YOUR FAMILY USE BY KEEPING A RECORD.

Distribute Worksheet 5-4 and tell the students to put their names and the date at the top.

Ask:

WHAT ARE THE THINGS LISTED ON THE SIDE OF THE WORKSHEET?

Read aloud the water uses listed.

WHAT DO YOU THINK THE NUMBERS NEXT TO THESE WATER USES ARE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
CUPS DO YOU THINK WOULD BE IN	--suggest, "Ten," "Hundred," "Fifty."
D OUT WHO'S RIGHT.	
dents to fill a one-gallon container ing cup and a funnel. This will there are about sixteen cups in one	
WE FIND OUT HOW MUCH WATER WE E DAY?	--suggest, "Measure the water," "Count how many gallons."
WE FIND OUT HOW MUCH WATER OUR ES IN ONE DAY?	--suggest, "Keep count," "Have them count," "Measure."
ING TO FIND OUT HOW MUCH WATER YOU FAMILY USE BY KEEPING A RECORD.	
sheet 5-4 and tell the students to and the date at the top.	
HE THINGS LISTED ON THE SIDE OF EET?	--examine Worksheet 5-4 and respond, "Ways we use water."
water uses listed.	
U THINK THE NUMBERS NEXT TO R USES ARE?	--respond, "How much we use," "How many times we use water."

ACTIVITY
5-6

MATERIALS

TEACHING STRATEGIES

Explain to the students that this worksheet is what they will use to find out how much water they and thei families use in a day. The numbers tell how many gallons are used each time water is used for the purpose listed in the left-hand column.

Ask:

WHICH WATER USE REQUIRES THE MOST WATER?

WHICH USES THE LEAST AMOUNT OF WATER?

WHICH WATER USES HAVE NO AMOUNT NEXT TO THEM?

WE ARE GOING TO FIGURE OUT HOW MUCH WATER IT TAKES TO BRUSH YOUR TEETH AND TO FILL A MOP BUCKET.

If you have a sink in your classroom, stopper the drain. If you do not have a sink, place the dishpan and the bucket of water on a table.

Instruct the student who was asked to bring his toothbrush to brush his teeth. Be sure all water that he uses goes either in to the sink or the dishpan.

When the student is finished brushing his teeth, ask:

HOW CAN WE FIND OUT HOW MUCH WATER (Student's Name) USED TO BRUSH HIS TEETH?

Using a funnel, ask a student to pour the water from the dishpan (or collect the water in the sink and pour it) into the gallon jug used previously.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
the students that this worksheet is what se to find out how much water they and their e in a day. The numbers tell how many used each time water is used for the ted in the left-hand column.	
WATER USE REQUIRES THE MOST WATER?	--indicate the lawn watering.
USES THE LEAST AMOUNT OF WATER?	--indicate the drink of water.
WATER USES HAVE NO AMOUNT NEXT TO THEM?	--indicate brushing teeth, mop bucket.
GOING TO FIGURE OUT HOW MUCH WATER ES TO BRUSH YOUR TEETH AND TO FILL BUCKET.	
a sink in your classroom, stopper the you do not have a sink, place the dishpan ket of water on a table.	
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dent is finished brushing his teeth, ask:	
WE FIND OUT HOW MUCH WATER t's Name) USED TO BRUSH HIS TEETH?	--respond, "Measure how much water," "Pour the water into the gallon jug."
el, ask a student to pour the water from (or collect the water in the sink and o the gallon jug used previously.	

MATERIALS

TEACHING STRATEGIES

Ask:

HOW MUCH WATER IS USED TO BRUSH TEETH?

Help the students to estimate how much water was used (one gallon, three-fourths gallon, one-half gallon, or one-fourth gallon). Direct them to record this amount on their worksheets in the appropriate place.

HOW COULD WE FIND OUT HOW MUCH WATER IS USED IN A CLEANING PAIL OR MOP BUCKET?

Fill the bucket with water and measure the amount by pouring it into the gallon jug, as was done in the teethbrushing activity. Record the amount used on the worksheet.

Tell the students that as soon as they leave this science class, every time they use water in one of the ways on the worksheet they will put a check ( ) on the line next to that use. For example, if they have ten drinks of water there will be ten checks on the line. They will do this until they come back to science class the next day (twenty-four hours).

When they go home they will need to ask their parents how many times during the past twenty-four hours they used water in one of the ways listed. Again a check ( ) will be recorded for each time water was used in that way.

TEACHING STRATEGIES

ATER IS USED TO BRUSH TEETH?

ts to estimate how much water was used
ree-fourths gallon, one-half gallon, or
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E FIND OUT HOW MUCH WATER IS
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the gallon jug, as was done in the
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e of the ways listed. Again a check
orded for each time water was used in

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "A gallon," "About one-half a gallon," "Not quite a gallon."

--suggest measuring the water by filling the bucket up and pouring that water into the gallon jug.

MATERIALS

TEACHING STRATEGIES

Be certain all students understand this procedure before they leave class.

The next day say:

> HOW COULD WE FIND OUT THE TOTAL NUMBER OF GALLONS WE USED?

Direct the students to make the computations below. Proceed slowly and help them as necessary.

NOTE: Do not compute totals for drinking water since measurements are in cups instead of gallons. This water use will be discussed separately.

1. Count the total number of checks next to each water use and enter that number under the " " column on the right.

2. Multiply the total number of checks times the average gallons used and enter the total number of gallons used in the "Gallons" column on the right. For example, if there were five check next to Toilet, you would multiply five (number of checks) times five (average gallons used) and get twenty-five gallons of water used for toilet flushing that day. Do this for each water use.

3. Add the "Gallons" column and put the total for "You" and that for "Your Family" in the boxes next to the asterisks on the worksheet.

There should now be a total number of gallons for personal use and a total number of gallons for family use.

TEACHING STRATEGIES

ll students understand this procedure leave class.

say:

LD WE FIND OUT THE TOTAL NUMBER OF WE USED?

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now be a total number of gallons for and a total number of gallons for family

ANTICIPATED STUDENT BEHAVIORS

Students should:

--suggest adding and multiplying.

ACTIVITY
5-6

MATERIALS

TEACHING STRATEGIES

IN WHICH SEASON OF THE YEAR WOULD MORE WATER BE USED?

WHY?

IF YOUR CITY ALL OF A SUDDEN HAD A WATER SHORTAGE AND SAID YOU COULD USE ONLY ONE-HALF THE AMOUNT OF WATER YOU USUALLY DO, WHICH WATER USES WOULD YOU CUT OUT FIRST?

WHY?

WHICH WATER USE WOULD YOU CUT OUT LAST?

WHY?

WHAT ARE SOME OF THE THINGS YOU AND YOUR FAMILY COULD DO TO CUT DOWN THE AMOUNT OF WATER YOU USE?

DISC

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
SEASON OF THE YEAR WOULD MORE WATER	--suggest summer.
	--respond, "Because people are watering lawns, washing cars."
CITY ALL OF A SUDDEN HAD A WATER AND SAID YOU COULD USE ONLY ONE-HALF NT OF WATER YOU USUALLY DO, WHICH ES WOULD YOU CUT OUT FIRST?	--probably suggest water uses that require large amounts of water, such as car washing, dishwashers, lawn watering.
	--respond, "Because they use most water."
TER USE WOULD YOU CUT OUT LAST?	--respond, "My drinking water."
	--respond, "Because it doesn't use up much water."
SOME OF THE THINGS YOU AND YOUR ULD DO TO CUT DOWN THE AMOUNT YOU USE?	--respond with ways of cutting down the amount of water used.

DISCUSSION TIME

MATERIALS	TEACHING STRATEGIES
	Ask: DO YOU AND YOUR FAMILY USE A LOT OF WATER IN ONE DAY? WHO USES MORE WATER -- YOU OR YOUR FAMILY? YOU JUST KEPT TRACK OF HOW MUCH WATER YOU USED FOR PERSONAL CARE EVERYDAY. HOW COULD YOU FIGURE OUT HOW MUCH A FAMILY OF FIVE WOULD USE? WOULD A FAMILY OF FIVE OR A FAMILY OF THREE USE MORE WATER? HOW MANY DRINKS OF WATER DID YOU TAKE IN A DAY? HOW MANY CUPS DID WE FIND THERE WERE IN A GALLON? DO YOU DRINK EVEN ONE GALLON OF WATER IN A DAY? HOW DOES THE AMOUNT OF WATER YOU DRANK COMPARE WITH THE AMOUNT OF WATER USED FOR OTHER THINGS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
YOUR FAMILY USE A LOT OF WATER ?	--respond, "We sure do," "I really had to make a lot of marks."
ORE WATER -- YOU OR YOUR FAMILY?	--probably indicate the family.
EPT TRACK OF HOW MUCH WATER YOU ERSONAL CARE EVERYDAY. HOW COULD OUT HOW MUCH A FAMILY OF FIVE	--suggest multiplying the number of gallons one person used by five.
MILY OF FIVE OR A FAMILY OF MORE WATER?	--indicate the larger family would use more water.
RINKS OF WATER DID YOU TAKE	--indicate the number of drinks (probably under a gallon).
UPS DID WE FIND THERE WERE IN A	--recall the activity of the day before and respond, "Sixteen."
NK EVEN ONE GALLON OF WATER IN	--look at the number of cups of water they drank and probably respond, "No."
IE AMOUNT OF WATER YOU DRANK COMPARE OUNT OF WATER USED FOR OTHER THINGS?	--respond, "It's smaller," "Not as much," "Much less."

MATERIALS

TEACHING STRATEGIES

At this time encourage discussion of water saving practices such as: not leaving the water running while doing dishes, brushing teeth, or shaving; taking a shower instead of a bath; washing dishes by hand instead of by machine; fixing a leaky faucet; and so forth.

ENCOUR
CREATI
IDEAS

GIVE S
STUDENTS
TO RE

Turn to the Numbers and Measurements page of the Student Record of Progress and find the column marked Activity 5-6, Water Use Calculation. Circle YES for each student who was able to calculate total water usages without help. Some students may require much help in doing such calculations.

TEACHING STRATEGIES

ncourage discussion of water saving
as: not leaving the water running while
brushing teeth, or shaving; taking a
of a bath; washing dishes by hand
machine; fixing a leaky faucet; and so

ENCOURAGE CREATIVE IDEAS

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

bers and Measurements page of the
of Progress and find the column marked
ater Use Calculation. Circle YES for
o was able to calculate total water
help. Some students may require much
uch calculations.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--be able to identify a cup and a gallon.*
- *--be able to show by measuring how many cups it takes to fill a gallon.*
- *--state that a family uses a great deal of water in one day.*
- *--keep a record of his water use on Worksheet 5-4.*
- *--state that drinking water is the most important water use.*

ACTIVITY
5-6

MATERIALS

TEACHING STRATEGIES

CHAN

See Change of Pacer 6.

TEACHING STRATEGIES

CHANGE OF PACER

f Pacer 6.

ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE A
ACTIVITY 5-6

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How many students followed through on the instructions for recording their use of water?
8

13. Did students have difficulty in understanding the computations involved in deter-

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
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☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. How many students followed through on the instructions for recording their use of water?

13. Did students have difficulty in understanding the computations involved in determining total water use?

14. Turn to the numbers and measurements page of the Student Record of Progress and record the students' ability to calculate total water use.

Side A

UNIT V, CORE A
ACTIVITY 5-6

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

REACTIONS TO CORE A

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core? ☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

Side A

NEW STUDENTS ENTERING DURING THIS C

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Te
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-
American
O = other

W=WIS
B=Bir
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

p	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				

W=WISC
B=Binet
O=Other
(Name)

n

for Dropping

Me and my Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE B. SOURCES OF WATER

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

The two parts of this uni
air and water as major compon
Part 1 emphasizes the imp
environment by helping the st

1. Understand the need for
2. Recognize the sources of
3. Realize the problems ass
4. Realize the problems ass
5. Recognize the impact of
6. Understand the broad pro

Part 2 emphasizes the nat
by helping the student to:

7. Understand the compositi
8. Realize that the quality
9. Realize that substances
10. Comprehend the impact of

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2. Establish that the wate
3. Establish that somethin

T V. AIR AND WATER IN MY ENVIRONMENT

E B. SOURCES OF WATER

BSCS

UNIT V GOALS

The two parts of this unit will serve to develop an appreciation of the roles of air and water as major components of our environment.

Part 1 emphasizes the importance of water as a vulnerable component of our environment by helping the student to:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Part 2 emphasizes the nature of air as a complex component of our environment by helping the student to:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

CORE B OBJECTIVES

1. Identify the immediate sources of water available to people.
2. Establish that the water supply is limited.
3. Establish that something must [illegible] done to our water before we drink it.

CORE B RATIONALE

Although most people do not drink raw water as it comes from lakes or streams, many people do drink untreated water from privately owned shallow wells. In these instances, nature has provided a filtration system of soils, sands, and gravels through which the water must pass. The general trend for people to live in cities or towns with locally abundant and concentrated wastes dictates the need for some pretreatment of municipal water supplies. This core of activities will serve to introduce the student to the advantages and complexities of a combined community effort in supplying usable water.

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BACKGROUND INFORMATION FOR THE TEACHER

There are essentially no natural sources of absolutely pure water in the chemical sense. All natural waters contain some dissolved and/or suspended substances. From the point of view of human health alone, some of these are desirable, some are undesirable, and some don't seem to matter. Depending on the source, however, something usually must be done to our water before we drink it.

If we drink water from a well or spring, we are not drinking pure water. It most certainly will contain dissolved substances. This water may, however, be free of microbial contamination. The water has been filtered through natural layers of soil, sand, or gravel and most likely combinations of these. A water treatment plant may be thought of as a formalized model of nature's system of purification. Since the demands placed on this artificial system may be high in terms of volume treated, some chemicals (such as lime and alum) are added to duplicate processes that otherwise might occur in the soil.

Me and my Environment

UNIT V
CORE B

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ✔ *in t*
be prepared several days or weeks in advance. Use t
a teaching and preparation schedule. All supplies n

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italic*
5-7. Water at Hand Days needed: 1	Chalkboard 35 mm Slide projector	Slide 5-10	House diagr
5-8. A Trip to the Water Plant Days needed: 2			*Make arrang in advanc*
5-9. A Water Treatment Plant Model Days needed: 3	Water		Mud added f model
	Gallon jar		For mixing
	Mud or garden soil		To mix with
	Egg beater		Used for st
	Books, boxes, blocks, etc.		To prepare
	Chlorine bleach		Used in chl
	35 mm Slide projector		
		Slide 5-11	Of Workshee
		Slide 5-12	Of Workshee
		Slide 5-13	Water Treat
		Worksheet 5-5	
		Large beaker, 1000 ml	
		Vinyl tubing, 1/4 inch inside diameter	Four feet s troughs
		Powdered alum	Used to tre
		Measuring spoons	One set
		Pneumatic troughs	Three, to s
		Screw clamps	One per cla
		Gauze squares	One square

PLANNING GUIDE

BSCS

ities (*indicated in italic* and an ⬋ *in the margin*) must
d several days or weeks in advance. Use this summary as
and preparation schedule. All supplies needed are listed.

upplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
Slide 5-10	House diagram
	Make arrangements for trip to water treatment plant well in advance.
	Mud added for testing the effectiveness of the water treatment model
	For mixing mud and water
	To mix with water
	Used for stirring water in mixing basin
	To prepare different levels to set the pneumatic troughs on
	Used in chlorination set-up of water purification
Slide 5-11	Of Worksheet 5-5
Slide 5-12	Of Worksheet 5-5
Slide 5-13	Water Treatment Model
Worksheet 5-5	
Large beaker, 1000 ml	
Vinyl tubing, 1/4 inch inside diameter	Four feet should provide enough for the connections between troughs
Powdered alum	Used to treat the water
Measuring spoons	One set
Pneumatic troughs	Three, to serve as water treating basins
Screw clamps	One per class
Gauze squares	One square for filtration trough

Me and my
Environment

UNIT V
CORE B

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* *i*
be prepared several days or weeks in advance. Us
a teaching and preparation schedule. All supplie

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ital*
5-9. A Water Treatment Plant Model (continued)		Coarse sand Fine sand Very fine sand	Wash all
5-10. Clues to Success: Background and Understanding Days needed: 1	35 mm Slide projector	Worksheet 5-6 Worksheet 5-7 Slide 5-4 Slide 5-14 Slide 5-15 Slide 5-16 Slide 5-17 Tallysheet 5-3	Pad of 2 Pad of 2 Street w Of Works Of Works Of Works Of Works

PLANNING GUIDE

tivities (*indicated in italics and an* ↖ *in the margin*) must ared several days or weeks in advance. Use this summary as ing and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Coarse sand Fine sand Very fine sand	Wash all three types of sand
Worksheet 5-6	Pad of 20 sheets; one worksheet per student
Worksheet 5-7	Pad of 20 sheets; one worksheet per student
Slide 5-4	Street washer
Slide 5-14	Of Worksheet 5-6
Slide 5-15	Of Worksheet 5-6
Slide 5-16	Of Worksheet 5-7
Slide 5-17	Of Worksheet 5-7
Tallysheet 5-3	

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.

Core B Objectives for the Student:

1. Identify the immediate sources of water available to people.

ENVIRONMENTAL THEME:

Finiteness of Resources

INQUIRY SKILLS:

Identifying

PROBLEM-SOLVING SKILLS:

Organizing Data

PRACTICAL APPLICATION:

Realizing What the Basic Construction of a House Is and How Utilities Are Brought to Members of a Community

Activity 5-7. Water at Hand

This activity will emphasize family water use and its sources. The students will identify and discuss the sources of water for their families by tracing water pipes in a cutaway house diagram to a main water pipe.

ACTIVITY

Goals for the Student:
1. Understand the need for water.

2. Recognize the sources of water.

B Objectives for the Student:
1. Identify the immediate sources of water available to people.

TAL THEME:
eness of Resources

ILLS:
ifying

LVING SKILLS:
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APPLICATION:
zing What the Basic Construction of a
Is and How Utilities Are Brought to
rs of a Community

Water at Hand

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tudents will identify and discuss the
r for their families by tracing water
way house diagram to a main water pipe.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE B. SOURCES OF WATER

ACTIVITY 5-7. WATER AT HAND

During this activity, each student should:

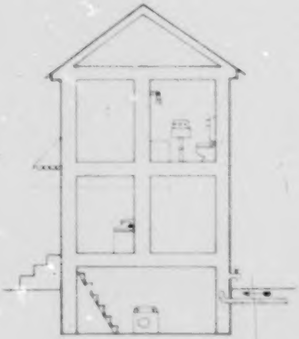
- *--recall the family uses of water.*
- *--describe the drawing of the house.*
- *--trace the water source of each water outlet in a home to the main water pipe.*
- *--identify a well and/or water plant as the main source of community water.*
- *--begin to consider what a water plant does.*
- *--consider the process of a water plant.*

ACTIVITY
5-7

MATERIALS

*35 mm Slide projector
Slide 5-10

Slide 5-10



*Not furnished in materials kit

TEACHING STRATEGIES

Begin by saying:

A FEW DAYS AGO WE FOUND OUT HOW MUCH WATER OUR FAMILIES USE IN A DAY. WHAT WERE SOME OF THE THINGS OUR FAMILIES USE WATER FOR?

Project Slide 5-10 on the chalkboard, and say:

WHAT DOES THIS DRAWING SHOW?

WHY ARE WE ABLE TO SEE INSIDE?

WOULD SOMEONE DESCRIBE WHAT THE HOUSE IS LIKE ON THE OUTSIDE?

WHAT IS THE INSIDE OF THE HOUSE LIKE?

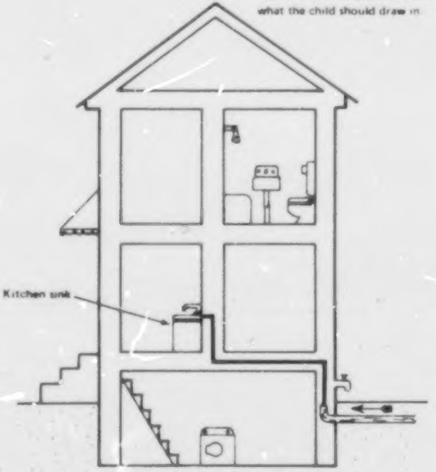
As the students describe the house, have them label the items they mention on the projected image.

If students do not notice or mention the outside pipe running to the house, be sure to draw their attention to it by asking them what it carries, what would be coming into the house, and so on until they are able to identify it as a water pipe, or water supply.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ing:	
AYS AGO WE FOUND OUT HOW MUCH WATER ILIES USE IN A DAY. WHAT WERE SOME THINGS OUR FAMILIES USE WATER FOR?	--recall Activity 5-4 and reply, "Drinking," "Flushing the toilet," "Washing clothes," "Doing dishes," "Taking a bath," "Cleaning."
e 5-10 on the chalkboard, and say:	
ES THIS DRAWING SHOW?	--look at the slide and reply, "A house."
WE ABLE TO SEE INSIDE?	--reply, "Because one wall is not drawn," "Because it's cut in half."
OMEONE DESCRIBE WHAT THE HOUSE IS THE OUTSIDE?	--describe the house, being sure to mention that it has three floors, a basement, a roof, four rooms, a pipe coming in the house, and an outside faucet.
THE INSIDE OF THE HOUSE LIKE?	--describe what is inside the house, being sure to include a toilet, sinks, tub, shower, and washing machine.
nts describe the house, have them label ey mention on the projected image.	
do not notice or mention the outside pipe he house, be sure to draw their attention ing them what it carries, what would be the house, and so on until they are able it as a water pipe, or water supply.	

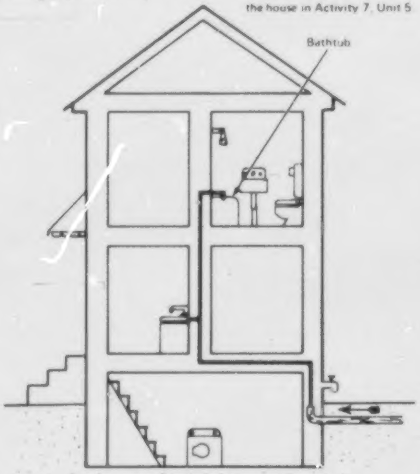
MATERIALS

Diagram 5-3



Refer to the blackboard slide of the house and water outlets in Activity 7, Unit 5. These diagrams will show what the child should draw in.

Diagram 5-4



Refer to the blackboard slide of the house in Activity 7, Unit 5.

TEACHING STRATEGIES

Then say:

> THIS HOUSE HAS ALL THE THINGS IN IT THAT A FAMILY NORMALLY USES WATER FOR.
>
> HERE IS A KITCHEN SINK. WHAT WOULD A FAMILY USE THIS FOR?
>
> WHERE DOES THE WATER IN THE SINK COME FROM?
>
> WHERE DOES THE WATER IN A FAUCET COME FROM?

Choose a student or a volunteer to come to the chalkboard and draw a line that will show where the water in the faucet comes from. (See Diagram 5-3.)

Continue by pointing to the bathtub and asking:

> WHERE DOES THE WATER IN THE BATHTUB COME FROM?
>
> WHERE DOES THE WATER IN THE FAUCET COME FROM?

Direct a student or a volunteer to draw a line on the house projection to show where the water from the bathtub comes from. (See Diagram 5-4.)

Continue with this line of questioning until the students have traced the source of each water outlet in the house to the main water pipe. (See Diagram 5-5.)

EACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HAS ALL THE THINGS IN IT THAT RMALLY USES WATER FOR.	
ITCHEN SINK. WHAT WOULD A HIS FOR?	--respond, "For dishes," "To fill a bucket," "For drinking water," "To get cooking water."
HE WATER IN THE SINK COME FROM?	--respond, "The faucet."
HE WATER IN A FAUCET COME FROM?	--respond, "Water pipes," "In the wall," "In the basement."
or a volunteer to come to the raw a line that will show where the cet comes from. (See Diagram 5-3.)	--draw a line from the faucet through the walls and floor or ceiling to the main water pipe.
ting to the bathtub and asking:	
HE WATER IN THE BATHTUB	--respond, "The faucet."
HE WATER IN THE FAUCET	--respond, "The water pipes."
or a volunteer to draw a line on the to show where the water from the om. (See Diagram 5-4.)	--draw a line from the faucet through the walls and floor or ceiling to the main water pipe.
s line of questioning until the ced the source of each water outlet he main water pipe. (See Diagram 5-5.)	

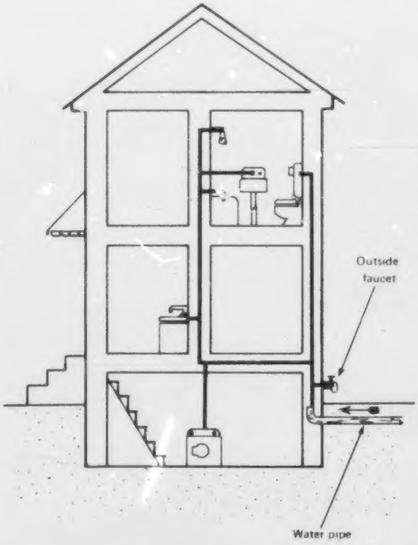
ACTIVITY
5-7

MATERIALS

Diagram 5-5

Refer to the blackboard slide of the house in Activity 7, Unit 5.

This diagram will show the house as it should look when all water outlets are connected to the main water pipe.



TEACHING STRATEGIES

When all the water outlets in the house have been traced to the main water pipe, ask:

> WHERE DO ALL OF OUR DRAWN LINES END UP?

> WHERE DOES THE WATER IN THE MAIN WATER PIPE COME FROM?

If wells are the common water source in the community, the discussion of the local water source will end. If this is the case, continue by saying:

> WE GET OUR WATER FROM WELLS, BUT WHERE WOULD PEOPLE IN A CITY GET THEIR WATER?

If students suggest that water in a household water system is from a lake or a river, remind them that it doesn't go directly from a lake or river to the house, but rather goes to some place in between.

> HOW DOES THE WATER GET FROM THE WATER PLANT TO YOUR HOUSE? THE WATER PLANT MIGHT BE MANY MILES FROM THE HOUSE.

> HOW DO YOU THINK THE CITY KNOWS YOU USE WATER?

> WE LOOKED AT HOW ONE FAMILY GETS WATER. WHERE DO THE FAMILIES IN THE CITY WHO LIVE IN HOUSES AND APARTMENTS GET THEIR WATER?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
water outlets in the house have been main water pipe, ask:	
ALL OF OUR DRAWN LINES END UP?	--respond, "In the outside pipe," "In the water line."
ES THE WATER IN THE MAIN WATER E FROM?	--respond, "Wells," or "Water treatment plant," depending on which is common in the community.
the common water source in the community, n of the local water source will end. If ase, continue by saying:	
JR WATER FROM WELLS, BUT WHERE WOULD N A CITY GET THEIR WATER?	--respond, "From a water plant," "From lakes," "From a reservoir."
ggest that water in a household water n a lake or a river, remind them that it rectly from a lake or river to the house, es to some place in between.	
THE WATER GET FROM THE WATER PLANT IOUSE? THE WATER PLANT MIGHT BE MANY DM THE HOUSE.	--respond, "Through pipes," "Underground."
DU THINK THE CITY KNOWS YOU USE WATER?	--respond, "They read the meter," "They send a guy around."
AT HOW ONE FAMILY GETS WATER. WHERE AMILIES IN THE CITY WHO LIVE IN HOUSES RMENTS GET THEIR WATER?	--respond, "Through pipes coming from the water plant," "From the water plant," "From the same place."

MATERIALS

TEACHING STRATEGIES

To encourage students to begin thinking about what happens at a water treatment plant and to conclude this activity, ask such open-ended questions as:

WHAT IS A WATER PLANT FOR?

WHAT DO THEY DO AT A WATER PLANT?

WHY DOES A CITY NEED A WATER PLANT?

CHANGE O

See Change of Pacer 7.

TEACHING STRATEGIES

dents to begin thinking about what
er treatment plant and to conclude this
ch open-ended questions as:

ATER PLANT FOR?

Y DO AT A WATER PLANT?

CITY NEED A WATER PLANT?

CHANGE OF PACER

cer 7.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, __each__ __student__ should, as a minimum:

--have recalled the family uses of water.
--have traced at least one water outlet to its source at the main household water pipe.
--have identified the community water source as the water plant.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE B
ACTIVITY 5-7

Teacher ______________

Activity name suggested by class:

BSCS USE:	Post ____	Tally ____	Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How effective were the drawings of the house in demonstrating the source of water to a house?

MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How effective were the drawings of the house in demonstrating the source of water to a house?

13. Did students seem to understand that the pipes were inside the walls? Comment.

UNIT V, CORE B
ACTIVITY 5-7

Teacher ________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
6. Understand the broad problems of water management.

Core B Objectives for the Student:

1. Identify the immediate sources of water available to people.
3. Establish that something must be done to our water before we drink it.

ENVIRONMENTAL THEME:
Finiteness of Resources

INQUIRY SKILLS:
Describing

PROBLEM-SOLVING SKILLS:
Asking Questions

PRACTICAL APPLICATION:
Knowledge That He Is Dependent upon Someone for His Water and That Water Is Not an Unlimited Resource

Activity 5-8. A Trip to the Water Plant

In this activity, students will visit the city (or county) water treatment plant. They will gain

ACTIVITY

Goals for the Student:
1. Understand the need for water.

2. Recognize the sources of water.

3. Realize the problems associated with the preparation of usable water.

6. Understand the broad problems of water management.

B Objectives for the Student:
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NTAL THEME:
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APPLICATION:
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A Trip to the Water Plant

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UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE B.	SOURCES OF WATER
ACTIVITY 5-8.	A TRIP TO THE WATER PLANT

BSCS

During this activity, each student should:

--visit the community water treatment plant.
--participate in a discussion of their experiences at the plant.

MATERIALS

TEACHING STRATEGIES

first-hand knowledge of what is done to the water befor it reaches their homes.

Teacher Preparation:

Contact the supervisor of the treatment plant at least a week in advance of the trip. Also make the necessary arrangements for transportation, permission slips, and so on. Set a date for the trip that is acceptable to the treatment plant, your administration, and to your class. Call the treatment plant again the day before the trip to confirm your plans. If your students live in an area with no treatment plant or an extremely small one, you might want to visit the water treatment plant of a nearby city.

Water treatment plants usually do not vary a great deal from community to community. The average treatment plant functions in a manner similar to that outlined below.

1. Analysis of the untreated water

   There is a federal standard set for water quality that most states have adopted. Some of the tests made are for color, turbidity (amount of soil in the water), acidity, natural fluoride content, hardness (amount of dissolved minerals), and temperature.

TEACHING STRATEGIES

owledge of what is done to the water before
eir homes.

ration:

upervisor of the treatment plant at least
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on. Set a date for the trip that is
the treatment plant, your administration,
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er), acidity, natural fluoride content,
s (amount of dissolved minerals), and
ture.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

2. Treatment
    a. Screening -- mainly to remove algae in the water.
    b. Addition of alum -- alum will clump together and attract dirt, bacteria, and so forth. (This is called flocculation.)
    c. Settling -- to allow the clumps of alum and its attracted dirt to settle out.
    d. Addition of chemicals -- usually chlorine, fluoride, ammonia, lime.
    e. Filtering -- through layers of charcoal, sand, gravel, and clay tiles.
3. Finished water -- pumped to city systems

While on the visit the students should look for, or try to find out, the following kinds of information. Review these questions with the students before leaving on the trip:

1. Where is the water treatment plant for the community?
2. Where does the water in the treatment plant come from? (What is the community water source?)
3. Are people allowed around the area that the water comes from? Would anything be able to pollute the water?
4. By what means does the water get to the treatment plant?
5. How do they find out if the water is safe to drink?
6. Why does the water need to be treated?
7. What do they do to the water to make it so it is drinkable?
8. How are the microbes in the water killed?
9. How do they get the dirt out?
10. How much water do they treat every day?

TEACHING STRATEGIES

ning -- mainly to remove algae in the
.
ion of alum -- alum will clump together
ttract dirt, bacteria, and so forth.
is called flocculation.)
ing -- to allow the clumps of alum and
ttracted dirt to settle out.
ion of chemicals -- usually chlorine,
ide, ammonia, lime.
ring -- through layers of charcoal, sand,
l, and clay tiles.

water -- pumped to city systems

sit the students should look for, or
, the following kinds of information.
stions with the students before
trip:

the water treatment plant for the
?
s the water in the treatment plant come
hat is the community water source?)
e allowed around the area that the
s from? Would anything be able to
e water?
eans does the water get to the
plant?
y find out if the water is safe

the water need to be treated?
ey do to the water to make it so it
le?
e microbes in the water killed?
y get the dirt out?
ater do they treat every day?

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

11. How does the water get from the plant to the community?
12. Is the water stored anywhere after it is treated?
13. How do they know how much water to treat and send to the community?
14. Is the same amount of water used all year around?
15. What are the plans for future water use?
16. Would it be just as easy and save money for each home to clean its own water?

Have this list of questions duplicated so that the students can refer to them during the trip. Encourage the students to ask questions at the plant if they don't understand or are curious about something. They may wish to bring tape recorders to record the information or to answer questions.

The day after the trip go over the list of questions and discuss them. Also discuss their experiences, any observations they have, opinions, and so forth.

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TEACHING STRATEGIES

s the water get from the plant to the
ty?
water stored anywhere after it is
?
they know how much water to treat and
the community?
same amount of water used all year

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they have, opinions, and so forth.

DISCUSSION TIME

INVOLVE YOUR SLOWEST STUDENTS

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES
	See Change of Pacers 8, 9, and 10.

EACHING STRATEGIES

ers 8, 9, and 10.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have visited the community water treatment plant.*
- *--have recognized that something is done to make the water better before it reaches his home.*
- *--experience the care his water gets before it arrives in his house.*

CHANGE OF PACER

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE B
ACTIVITY 5-8

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were there any problems in arranging the trip to the water treatment plant?
☐ Yes ☐ No Comment.

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were there any problems in arranging the trip to the water treatment plant?
☐ Yes ☐ No Comment.

13. How many of your students do you feel would be able to explain the water treatment plant to another person?

14. Given your experience with this activity, would you like to have more or fewer field trip activities? Explain.

UNIT V, CORE B
ACTIVITY 5-8

Teacher ____________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Realize the problems associated with the preparation of usable water.

Core B Objectives for the Student:

3. Establish that something must be done to our water before we drink it.

ENVIRONMENTAL THEME:

Finiteness of Resources, Ecological Trade-offs

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Identifying Variables

PRACTICAL APPLICATION:

Manipulation of Materials; Seeing and Doing Himself the Same Thing That Is Done to His Water by the City Treatment Plant; Working in a Group

Activity 5-9. A Water Treatment Plant Model

This activity will utilize information obtained on the field trip. Students will be given the opportunity to apply what they have learned by building a model water treatment plant. They will purify some muddy water with their model treatment plant. This plant will later be used to purify water from the flasks of water set up in Activity 5-12.

TIVITY

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Realize the problems associated with
the preparation of usable water.

Objectives for the Student:
Establish that something must be
done to our water before we drink it.

L THEME:
ess of Resources, Ecological
ffs

LS:
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ING SKILLS:
ying Variables

PLICATION:
ation of Materials; Seeing and Doing
the Same Thing That Is Done to His
y the City Treatment Plant; Working
oup

Water Treatment Plant Model

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ave learned by building a model water
They will purify some muddy water
treatment plant. This plant will
purify water from the flasks of water
y 5-12.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE B. SOURCES OF WATER

ACTIVITY 5-9. A WATER TREATMENT PLANT MODEL

During this activity, each student should:

- *--compare the diagram of the water treatment plant with what they saw at the local plant.*
- *--examine the components of the class treatment plant.*
- *--participate in setting up the class water treatment plant.*
- *--participate in the operation of the water treatment plant.*
- *--compare water leaving the plant with that put in.*

ACTIVITY
5-9

MATERIALS

- Slides 5-11 through 5-13
- Worksheet 5-5
- Large beaker
- Plastic tubing, 1/4-inch diameter
- Powdered alum
- Measuring spoons
- Pneumatic troughs, 3
- Coarse sand
- Fine sand
- Very fine sand
- Screw clamp, 1
- *Gallon jar
- *Muddy or dirty water
- *Egg beater
- *Materials to support containers at different levels, (books, blocks, boxes, etc.)
- *Chlorine bleach
- *Gauze squares, 1 X 1 inch, 2
- *35 mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Please refer to Slide 5-13 while reading this explanation.

   The water treatment plant model, though apparently complicated, may be characterized as four separate processes. These are:

   a. Chemical treatment
   b. Settling
   c. Filtration
   d. Sterilization

   These processes are carried out in the model using four separate containers (i.e., three pneumatic troughs and one large beaker). Muddy water is prepared in any handy receptacle, for example, a household bucket. From there it is simply poured into Trough 1 where it is batch-mixed with alum. The alum serves to enhance flocculation of particulate matter. This is a physical-chemical reaction common to most water treatment plants. If the plant that you visited uses additional chemicals such as chloramines or lime, simply explain to the class that these are special treatments developed for local needs. When Trough 1 is full, the alum added, and the water thoroughly mixed, open the clamp between Troughs 1 and 2. The water should be allowed to flow slowly from Trough 1. The function of Trough 2 is to allow the flocculated particles in suspension to settle out. Notice that the water both enters and leaves Trough 2 from the surface. Therefore, Trough 2 will always contain a residual volume of water that will provide

TEACHING STRATEGIES

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on.

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is to allow the flocculated particles in
on to settle out. Notice that the water
ers and leaves Trough 2 from the surface.
e, Trough 2 will always contain a
volume of water that will provide

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES

opportunity for sediment to accumulate. For this reason, no water will flow into Trough 3 until a second batch of water and alum has been provided in Trough 1. When this has been done, water will flow into Trough 2 and immediately overflow into Trough 3. Remember, this water should flow slowly to allow settling. The now partially clarified water will be filtered through the sand beds. The water will percolate through the layers of sand and flow without further interruption into a large beaker for sterilization. Since the flow of water through the system is essentially limited by the filtration rate through the sand in Trough 3, overflow at this point must be controlled above by the clamp between Troughs 1 and 2. Up to this point, treatment has been limited to chemical flocculation and mechanical (sand) filtration. There may still be microbes present. Usable water is prepared by final sterilization with chlorine (the active ingredient of household bleach).

2. Prepare a jar of muddy water by mixing one-half teaspoon of mud or dirt to a gallon of water.

Begin by asking:

WHERE DO WE GET OUR SUPPLY OF WATER?

WHAT ARE THE STEPS IN THE PURIFICATION OF OUR WATER?

TEACHING STRATEGIES

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clarified water will be filtered
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f mud or dirt to a gallon of water.

GET OUR SUPPLY OF WATER?

E STEPS IN THE PURIFICATION
R?

ANTICIPATED STUDENT BEHAVIORS

Students should:

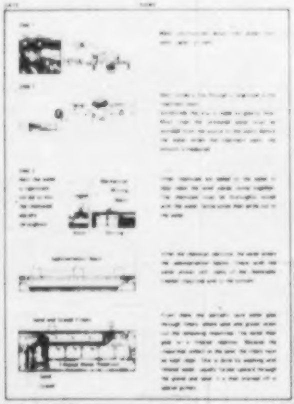
--respond, "River," "Lake," "Stream," or "Well."

--recall the water purification process from the field trip.

ACTIVITY
5-9

MATERIALS

Slide 5-11 (Worksheet 5-5A)



Slide 5-12 (Worksheet 5-5B)

TEACHING STRATEGIES

Review the entire path of water through the local plant List the steps in the treatment (purification) process on the chalkboard. Distribute Worksheet 5-5. This worksheet is a diagram of a typical water treatment plant for a large city. Project Slides 5-11 and 5-12 o Worksheet 5-5. Compare the features of the local plant which are listed on the chalkboard, with those of the typical treatment plant shown on the worksheet.

Display the gallon jar of muddy water.

> LET'S CALL THIS MUDDY WATER JAR OUR WATER SOURCE. COULD WE BUILD A MODEL WATER TREATMENT PLANT THAT WOULD PURIFY THIS WATER?

Discuss the steps to be considered and list them on the chalkboard. Be sure to include the following:

1. Alum addition
2. Mixing
3. Sedimentation
4. Sand and gravel filters
5. Chlorination

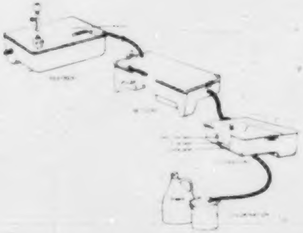
Place the components of the water treatment plant model on a table.

Discuss each part and identify it in relation to a typical water treatment plant. (See Worksheet 5-5A and 5-5B.)

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ire path of water through the local plant. in the treatment (purification) process ard. Distribute Worksheet 5-5. This diagram of a typical water treatment rge city. Project Slides 5-11 and 5-12 of Compare the features of the local plant, ed on the chalkboard, with those of the ent plant shown on the worksheet.	--compare the local plant with the worksheet plant.
llon jar of muddy water.	
L THIS MUDDY WATER JAR OUR WATER COULD WE BUILD A MODEL WATER PLANT THAT WOULD PURIFY THIS WATER?	--respond, "Yes," "No," "Maybe."
eps to be considered and list them on the e sure to include the following: ition ation gravel filters tion	
onents of the water treatment plant le.	--examine the components.
art and identify it in relation to a treatment plant. (See Worksheet 5-5A and	--compare the components with the local plant and the worksheet plant.

MATERIALS

Slide 5-13



TEACHING STRATEGIES

Project Slide 5-13 (diagram of the water treatment model) and allow students time to study the slide. Permit the students to speculate on the way the components are to be set up and used. However, be sure to follow the set-up instructions and operating instructions very closely. Involve as many students as possible in the set-up and operation of the model.

Set-Up Instructions:

1. Four different levels will be needed. Blocks of wood, cardboard boxes, books stacked under the troughs, or using shelves or study carrels might be a few ways of obtaining various levels to work with. Trough 1 will be the highest level, Trough 2 the next highest, Trough 3 the lowest. The beaker or jar which catches the final filtered water will probably need to be slightly lower than Trough 3 to facilitate water flow.

2. Wash each grade of sand to remove any dirt or other particles present. Place the rubber bulb of a medicine dropper over the upper outlet of Trough 1. Place a short piece of tubing over the bottom opening of Trough 2. Thread this tubing upward through the tab above. This simply blocks off the bottom opening of Trough 2, which is not needed in the set-up.

3. Connect one end of a piece of tubing to the bottom opening of Trough 1 and let the other end hang over the top of Trough 2. The lengths of the tubing will depend on your individual set-up.

4. With another piece of tubing, connect the top opening of Trough 2 to the top opening of Trough 3.

13 (diagram of the water treatment
students time to study the slide.
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ning of Trough 1 and let the other end
the top of Trough 2. The lengths of
will depend on your individual set-up.

r piece of tubing, connect the top
Trough 2 to the top opening of

MATERIALS

TEACHING STRATEGIES

5. Finally, connect one end of a length of tubing to the bottom opening of Trough 3 and let the other end open into the chlorination container.

6. Place the screw clamp on the tubing between Troughs 1 and 2.

7. Place a one-inch-square piece of gauze in the bottom opening of Trough 3 to prevent sand from clogging the outlet.

8. Prepare the filter basin (Trough 3) by placing a layer of coarse sand on the bottom, a layer of fine sand over that, and a final layer of very fine sand on top. Remember to wash the different grades of sand. This may be done by stirring the sand under several inches of water in a deep container. The dirt will float upward and may be poured off without spilling the sand into the sink.

The plant is now ready to be operated.

Operating Instructions:

REMINDER: Refer to the Teacher Preparation Section at the beginning of this activity.

Before a complete batch of water can be run through the system, it will be necessary to begin with a batch of water that will fill Trough 2. This trough will be constantly filled with water and therefore this first batch of water will remain in the trough until the second batch is begun.

TEACHING STRATEGIES

y, connect one end of a length of tubing
bottom opening of Trough 3 and let the
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lled with water and therefore this first
r will remain in the trough until the
is begun.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES

1. Fill Trough 1 with the dirty water from the gallon jug. This will be referred to as a batch of water. You will always run one batch of water through the system at a time.

2. Sprinkle one teaspoon of alum into the batch of dirty water. Mix with an egg beater. Be careful when mixing to avoid splashing.

3. Open up the clamp on the tubing between Troughs 1 and 2 and allow the water from Trough 1 to drain into Trough 2.

4. When Trough 2 is filled, close the clamp between Troughs 1 and 2.

5. Fill Trough 1 with another batch of water and mix the alum into it.

6. At this time open the clamps on the tubing between Troughs 1 and 2 and watch the system work!

7. When this first batch of water has been completely through the treatment system, follow Steps 5 and 6 and repeat with another batch of water.

8. The rate of flow through the entire system can be regulated by adjusting the screw clamp between Troughs 1 and 2.

When several batches of water have been treated and collected, ask:

> WHAT SHOULD BE ADDED TO THE CLEAN WATER AFTER IT IS FILTERED?

EACHING STRATEGIES

h 1 with the dirty water from the
. This will be referred to as a
ater. You will always run one batch
hrough the system at a time.

he teaspoon of alum into the batch of
r. Mix with an egg beater. Be careful
g to avoid splashing.

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d allow the water from Trough 1 to
Trough 2.

h 2 is filled, close the clamp between
nd 2.

h 1 with another batch of water and mix
to it.

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ughs 1 and 2 and watch the system work!

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6 and repeat with another batch of

flow through the entire system can
d by adjusting the screw clamp
ughs 1 and 2.

hes of water have been treated and

BE ADDED TO THE CLEAN WATER
FILTERED?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--examine Worksheet 5-5 for the answer, or recall from the treatment plant visit that chlorine is added after filtration.

MATERIALS

TEACHING STRATEGIES

**GIVE
STUDEN
TO**

Say:

CHLORINE BLEACH SUCH AS (brand name) CONTAINS "CHLORINE." (Put the word on the chalkboard.) CHLORINE IS USED IN WATER TREATMENT PLANTS TO STERILIZE THE WATER AFTER IT IS FILTERED. THAT MEANS IT IS USED TO KILL ANY BACTERIA THAT MAY STILL BE IN THE WATER AFTER IT IS FILTERED. SINCE CHLORINE IS A POISON, ONLY A SMALL AMOUNT IN PROPORTION TO THE WATER IS USED. WHEN DILUTED BY THAT MUCH WATER, THE CHLORINE IS NOT HARMFUL TO HUMAN BEINGS. IN FULL STRENGTH, HOWEVER, IT CAN BE VERY HARMFUL. THEREFORE, DO NOT TOUCH IT, TASTE IT, OR PLAY WITH IT IN ANY WAY.

WE WILL ADD ONE-HALF TEASPOON OF CHLORINE BLEACH TO OUR JAR OF CLEAN WATER.

Compare the water before and after treatment and ask:

HOW DOES THE COLOR OF OUR WATER COMPARE WITH THE WATER WE PUMPED OUT OF THE JAR?

DID OUR MODEL CLEAN THE WATER?

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
BLEACH SUCH AS (brand name) CONTAINS ." (Put the word on the chalkboard.) IS USED IN WATER TREATMENT PLANTS TO THE WATER AFTER IT IS FILTERED. S IT IS USED TO KILL ANY BACTERIA STILL BE IN THE WATER AFTER IT IS SINCE CHLORINE IS A POISON, ONLY MOUNT IN PROPORTION TO THE WATER IS EN DILUTED BY THAT MUCH WATER, THE IS NOT HARMFUL TO HUMAN BEINGS. IN NGTH, HOWEVER, IT CAN BE VERY THEREFORE, DO NOT TOUCH IT, TASTE AY WITH IT IN ANY WAY.	
DD ONE-HALF TEASPOON OF CHLORINE OUR JAR OF CLEAN WATER.	--follow the directions and add the chlorine bleach.
ter before and after treatment and ask:	
THE COLOR OF OUR WATER COMPARE WATER WE PUMPED OUT OF THE JAR?	--observe and respond, "It looks cleaner."
ODEL CLEAN THE WATER?	--analyze the results and infer that the water from the model is cleaner than the muddy water because it is clear.

MATERIALS

TEACHING STRATEGIES

DID OUR MODEL MAKE THE WATER AS CLEAN AS TAP WATER?

The model will be used again, so keep it as nearly intact as possible.

CHANGE O

See Change of Pacers 11 and 12.

TEACHING STRATEGIES

EL MAKE THE WATER AS CLEAN AS

e used again, so keep it as nearly
le.

CHANGE OF PACER

cers 11 and 12.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--analyze the results and infer that both tap water and that from the model are clean because they went through the same processes.

Upon completion of this activity, each student should, as a minimum:

--have participated in setting up and operating the water treatment model.
--have expressed in some way that the water coming from the model is cleaner than when it went in.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE B
ACTIVITY 5-9

Teacher ______________

Activity name suggested by class:

BSCS USE:	Post ____	Tally ____	Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the instructions regarding the set-up of the water treatment plant model clear and easily followed? ☐ Yes ☐ No If not, what problems did you find?

RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

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☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Were the instructions regarding the set-up of the water treatment plant model clear and easily followed? ☐ Yes ☐ No If not, what problems did you find?

13. Did you have any problems in the operation of the model? ☐ No ☐ Yes If so, what?

14. What indications were there that students were able to relate the model to the actual treatment plant which they visited?

Side A

UNIT V, CORE B
ACTIVITY 5-9

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.

Core B Objectives for the Student:

1. Identify the immediate sources of water available to people.
2. Establish that the water supply is limited.
3. Establish that something must be done to our water before we drink it.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Knowing the Problem and What To Do To Solve It

PRACTICAL APPLICATION:

Working Independently to Solve Problems,
Participating in a Class Discussion,
Knowing Directions of the Compass

ACTIVITY

Goals for the Student:
1. Understand the need for water.

2. Recognize the sources of water.

B Objectives for the Student:
1. Identify the immediate sources of water available to people.

2. Establish that the water supply is limited.

3. Establish that something must be done to our water before we drink it.

TAL THEME:
relationships of Environmental
nents

ILLS:
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LVING SKILLS:
ng the Problem and What To Do To
It

APPLICATION:
ng Independently to Solve Problems,
cipating in a Class Discussion,
ng Directions of the Compass

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE B.	SOURCES OF WATER
ACTIVITY 5-10.	CLUES TO SUCCESS: BACKGROUND AND UNDERSTANDING

ACTIVITY
5-10

MATERIALS

Worksheet 5-6
Worksheet 5-7
Slides 5-13 through 5-17
*35 mm Slide projector

Worksheet 5-6

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-10. Clues to Success: Background and Understanding

The purpose of this activity is to make the student aware of some of the things he has learned in the firs two cores of this unit as well as to inform you of his background strength in observing, describing, and understanding the use of the balance and the direction of the compass. Such information will help you to reinforce student progress, provide encouragement, and plan helpful activities.

Distribute Worksheet 5-6 and direct students to write their names and the date in the space provided.

Then say:

> READ EACH QUESTION TO YOURSELF AS I READ IT ALOUD TO YOU. THEN MARK YOUR ANSWER. LOOK ONLY AT YOUR OWN WORK AND WE WILL DISCUSS YOUR ANSWERS AFTER WE ARE FINISHED.

Read the statement and direct the students' attention the picture of the balances. Then read the question a the choices. Circulate around the room to be sure eac student is marking the correct question. Repeat this procedure for Question 2.

TEACHING STRATEGIES

. Clues to Success:
Background and Understanding

f this activity is to make the student
of the things he has learned in the first
this unit as well as to inform you of his
rength in observing, describing, and
the use of the balance and the directions
s. Such information will help you to
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TO YOU. THEN MARK YOUR ANSWER.
Y AT YOUR OWN WORK AND WE WILL
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f the balances. Then read the question and
Circulate around the room to be sure each
rking the correct question. Repeat this
Question 2.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--complete Worksheets 5-6 and 5-7.
--participate in a discussion of the items on
the worksheets.

MATERIALS

Worksheet 5-7

TEACHING STRATEGIES

Now have students turn the worksheet over and again put their names and the date in the spaces provided.

Say:

> QUESTION 3 STILL REFERS TO THE TEST AND
> PICTURES IN QUESTION 1. YOU CAN LOOK
> BACK AT THE PICTURES IF YOU NEED TO.

Read Question 3 and the choices twice, allowing plenty of time for students to respond.

For Questions 4 and 5, assist those students who need help in writing their answers.

When students have responded to Question 6, collect Worksheet 5-6. Distribute Worksheet 5-7. Have students find the side that starts with Number 7 and put their names and the date in the spaces provided.

Question 7 will be scored for following directions.

Say:

> QUESTION 7 ASKS YOU TO DO MANY THINGS.
> LISTEN CAREFULLY, FOR I WILL READ IT
> ONLY TWICE.

Read the entire item twice but do not read the words on the map.

TEACHING STRATEGIES

ts turn the worksheet over and again
and the date in the spaces provided.

STILL REFERS TO THE TEST AND
QUESTION 1. YOU CAN LOOK
PICTURES IF YOU NEED TO.

and the choices twice, allowing plenty
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ASKS YOU TO DO MANY THINGS.
FULLY, FOR I WILL READ IT

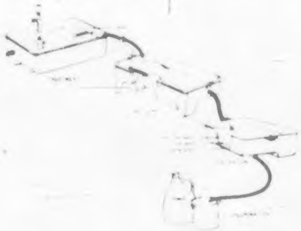
item twice but do not read the words

ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
5-10

MATERIALS

Slide 5-13



Slide 5-14

Slide 5-15

TEACHING STRATEGIES

GIVE
TIM
TO
THI

Continue reading the remaining questions on Worksheet 5-7A and 5-7B.

When you get to Question 12, project Slide 5-13 of the water treatment plant model while the question is read and students respond.

When the students have finished, collect Worksheet 5-7. After class, score and record responses to the worksheets in the Student Record of Progress. Follow the guidelines at the end of the activity.

Now project Slides 5-14 through 5-17 of the worksheets and discuss each item. The following list shows acceptable answers. Strategies are suggested for some items:

Item 1: A. 60 beads.

Before reading Item 2, ask:

> DOES THE PICTURE ON THE RIGHT SHOW HOW MANY BEADS THE PEAR WEIGHED AFTER DRYING?
>
> WHAT WOULD YOU DO TO THE BALANCE TO FIND OUT HOW MUCH THE DRIED PEAR WEIGHED?

TEACHING STRATEGIES

GIVE STUDENTS
TIME
TO
THINK

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 and 5-7B.

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PICTURE ON THE RIGHT SHOW HOW MANY
PEAR WEIGHED AFTER DRYING?

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ANTICIPATED STUDENT BEHAVIORS

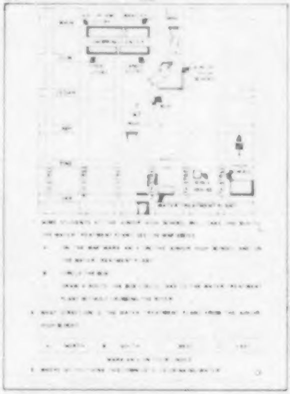
Students should:

--note that the balance beam is out of balance and respond, "No."

--respond, "Take beads away until the beads and pear are even," "Take beads off the tray until the arrow points to the center."

MATERIALS

Slide 5-16



Slide 5-17

TEACHING STRATEGIES

Item 2: D. Less than 30 beads.

Item 3: A. The pear was made up of more than one-half water.

If students had difficulty with Item 3, ask:

WHO KNOWS HOW MUCH THE PEAR WEIGHED BEFORE DRYING?

HOW MUCH WOULD HALF OF ITS WEIGHT BE?

HOW MUCH DID THE PEAR WEIGH AFTER DRYING?

WHAT CAUSED THE PEAR TO LOOSE ALL THAT WEIGHT?

HOW MUCH OF THE PEAR'S WEIGHT WAS WATER?

Item 4: For drinking, cooking, and washing.

NOTE: Students may be able to justify other answers.

Item 5: Watering lawns, washing cars, using dishwashers, and washing machines.

NOTE: Students may be able to justify other answers. If so, give them credit.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
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pear was made up of more than -half water.	
dents had difficulty with Item 3, ask:	
OWS HOW MUCH THE PEAR WEIGHED DRYING?	--respond, "60 beads."
CH WOULD HALF OF ITS WEIGHT BE?	--respond, "30 beads."
CH DID THE PEAR WEIGH AFTER ?	--respond, "Less than 30 beads."
AUSED THE PEAR TO LOOSE ALL EIGHT?	--respond, "The oven dried it out."
CH OF THE PEAR'S WEIGHT WAS	--respond, "More than one-half was water."
nking, cooking, and washing.	
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MATERIALS

TEACHING STRATEGIES

For Item 6, project Slide 5-13 of the water treatment plant model. The answers as shown on the worksheet should be:

ORDER	STEP	WHAT HAPPENS
3	Filtration	A chemical is added to kill microbes
2	Settling	A chemical is added to make dirt fall out of the water
1	Treatment	Tiny bits of things are screened out
4	Chlorination	Water is held while dirt falls to bottom

For Item 7, project Slide 5-16 of the map on the chalkboard. Have students follow each of the directions using chalk to mark the image on the chalkboard.

Item 8: B. South.

Item 9: From the Blue River.

Item 10: False statements are:

A. Running through sand makes water dirtier.

B. In our town water is boiled to clean it.

TEACHING STRATEGIES

roject Slide 5-13 of the water treatment
The answers as shown on the worksheet

TEP	WHAT HAPPENS..
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In our town water is boiled to clean it.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

For Item 11, if many words are unknown, you may wish to assemble a group of objects that have the characteristics of words in the list. Let students match words with objects they describe. Allow plenty of "hands on" experience with the objects.

Item 12: Accept all circled words for which students can give reasonable justifications as they look at Slide 5-13 and discuss this item.

Guidelines for Scoring and Interpretation

Before scoring the worksheets, turn to the "Progress in Following Directions" page of the Student Record of Progress. Follow the instructions there to rate each student's ability to follow directions. When you have done this, enter the student's performance on Item 7 of Worksheet 5-7A. Circle 5 if all of the following directions were followed:

A. Name and date written at top.

B. An X marked on the High School and Junior High School.

C. The bus circled.

D. Bus route marked.

E. Route to water plant doesn't cross river.

Now compare and combine your rating and the performance score to determine who needs the most help in following directions to succeed in the ensuing activities.

MATERIALS

TEACHING STRATEGIES

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EACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
5-10

MATERIALS

TEACHING STRATEGIES

Rating of Involvement: On the page titled "Responsibility and Involvement" in the Participation Section of the Student Record of Progress are guidelines to rate each student's involvement and interest in science to date. For students who are rated low, explore the suggestions in the introduction to the Student Record of Progress.

Now turn to the page titled "Development of Experience" in the Student Record of Progress and find the column headed Act. 5-10. Orientation in Space." Circle YES if students correctly completed Items 7C and 8 (drawing a route that doesn't cross the river and marking South as the direction of the water plant). Circle NO if either or both items were missed.

Next, find the column headed "Act. 5-10. Description." Circle HIGH if students underlined less than six words (words not known) and circled more than 12 words (words that describe water model). Circle LOW if students underlined more than eight words and circled less than six words. For the remaining students, circle SOME, indicating partial knowledge and use of descriptive words.

Use the Tallysheet at the back of the Student Record of Progress to record student responses to the remaining questions on Worksheets 5-6 and 5-7. When you have tallied the responses, review them to note items missed by many in the class and consider whether further review or repeating an activity is in order. Also note individual students who were unsuccessful over many items. Plan more assistance for these students to insure their success with the coming activities.

TEACHING STRATEGIES

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TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Record a summary of the tallied results in the Understanding Section of the Student Record of Progress as follows.

On the "Numbers and Measurements" page, find the column headed "Act. 5-10. Using a Balance." Circle YES if both Items 1 and 2 are correct; otherwise circle NO.

On the "Concepts" page, find the column titled "Act. 5-10. Water in Plants." Circle YES if this item is correct; otherwise circle NO.

Find the column titled "Act. 5-10. Water Uses," and circle YES if at least two correct answers were written for Items 4 and 5. Otherwise circle NO.

Find the column headed "Act. 5-10. Water Treatment." Circle YES if at least three of the four Items 6A, 6B, 9, and 10 were correctly answered; otherwise circle NO.

Now you can identify the students who were MOST and LEAST successful in understanding concepts in Cores A and B of Unit V. Circle HIGH if three or more of the columns were marked YES.

Circle LOW if one or less of the columns was marked YES. Explore whether these students are low in background skills as recorded in the first section of the Student Record of Progress. If so, perhaps a lower standard for success is appropriate for these children.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIO
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EACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
5-10

MATERIALS

TEACHING STRATEGIES

Students identified as low in understanding should receive special help and support to enable them to succeed in the following activities. If no students are low, you can congratulate yourself for an effective job of teaching.

TEACHING STRATEGIES

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can congratulate yourself for an
of teaching.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have completed Worksheets 5-6 and 5-7.

TEACHING STRATEGIES

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can congratulate yourself for an
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ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, __each__ __student__ should, as a minimum:

--have completed Worksheets 5-6 and 5-7.

UNIT V, CORE B
ACTIVITY 5-10

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO:	1/4	1/2	3/4	ALL
HIGH INTEREST						
MODERATE INTEREST OR INDIFFERENCE						
RESISTANCE OR DISLIKE						

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Do you feel that this clue to success will aid you in planning teaching strategies to help individual students? ☐ Yes ☐ No Comment.

UNIT V, CORE B
ACTIVITY 5-10

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

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If problems, what were they and how would you resolve them?

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☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

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☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Do you feel that this clue to success will aid you in planning teaching strategies to help individual students? ☐ Yes ☐ No Comment.

MODERATE INTEREST OR INDIFFERENCE					
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If problems, what were they and how would you resolve them?

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☐ Worthwhile --keep as is
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If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Do you feel that this clue to success will aid you in planning teaching strategies to help individual students? ☐ Yes ☐ No Comment.

13. Complete and send Tallysheet 5-3 to BSCS.

UNIT V, CORE B
ACTIVITY 5-10

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

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C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1c

UNIT V, CORE B
ACTIVITY 5-10

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

UNIT V
REACTIONS TO CORE B

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core? ☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

Side A

NEW STUDENTS ENTERING DURING THIS CO

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Tes
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-
American
O = other

W=WIS
B=Bin
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

p	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				

W=WISC
B=Binet
O=Other
(Name)

for Dropping

Me and my Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE C. PREPARATION OF USABLE WATER

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

The two parts of this unit w
air and water as major components
Part 1 emphasizes the import
environment by helping the studen

1. Understand the need for wate
2. Recognize the sources of wat
3. Realize the problems associa
4. Realize the problems associa
5. Recognize the impact of wate
6. Understand the broad problem

Part 2 emphasizes the nature
by helping the student to:

7. Understand the composition o
8. Realize that the quality of
9. Realize that substances are
10. Comprehend the impact of air

C

1. Examine some specific contami
2. Examine some techniques requi
3. Introduce the concept of the
4. Establish water as a finite

NIT V. AIR AND WATER IN MY ENVIRONMENT

ORE C. PREPARATION OF USABLE WATER

BSCS

UNIT V GOALS

The two parts of this unit will serve to develop an appreciation of the roles of air and water as major components of our environment.

Part 1 emphasizes the importance of water as a vulnerable component of our environment by helping the student to:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Part 2 emphasizes the nature of air as a complex component of our environment by helping the student to:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

CORE C OBJECTIVES

1. Examine some specific contaminants of water.
2. Examine some techniques required to remove these contaminants.
3. Introduce the concept of the natural water cycle.
4. Establish water as a finite resource.

CORE C RATIONALE

Except in very unusual circumstances, water must be treated in some way before it is suitable for human needs. In addition to natural impurities, many byproducts of man's activities produce problems for water treatment facilities. In this core of activities, students will have the opportunity to examine some specific examples of such contaminants and the problems associated with their removal. The core is climaxed with the study of the natural water cycle and the associated concept of water as a finite resource.

BAC

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problems associated
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Microbial contam
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The problem of
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5-12. This is the p
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more than about eight
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BACKGROUND INFORMATION FOR THE TEACHER

In spite of the current trend toward awareness of our environment, the problems associated with producing usable water have not changed a great deal in the past few years. Many of the specific problems have been with us for some time. The major contaminants of drinking water supplies may be categorized in three ways: (1) microbial, (2) unusual or unpredicted pollutants, and (3) persistant or predictable pollutants. This core of activities will introduce examples of each of these categories.

Microbial contamination of drinking water is a concern throughout the world and is discussed in Activity 5-11. The role of microbes in our environment, as well as in human health, has already been well established. At this point, treatment of water by boiling and chlorination are compared in a straightforward manner.

The problem of continuing and predictable pollutants will vary from region to region, but one example has been chosen for emphasis in Activity 5-12. This is the problem of soluble phosphates in surface water supplies. Phosphates are usually contributed to lakes and streams from two sources. The most loudly denounced is that of domestic sewage containing large amounts of washing detergents. In the past, commercial formulations of washday products contained large amounts of phosphate in addition to the surface active agent (detergent).

In response to public concern, detergent manufacturers have developed new formulations of familiar products. Nowadays, there are few that contain more than about eight percent phosphates. There are also many new non-phosphate products on the market.

A second, and in some cases equally important, source of phosphates is agricultural runoff. A considerable amount of the fertilizer applied to cropland (and lawns!) is never utilized by the plants as intended. Instead it is carried off in solution by runoff water to the nearest lake or stream.

Me and my Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE C. PREPARATION OF USABLE WATER

BACKGROUND IN

It is very importan
is not one of toxicity.
nutrient. Just as vario
on a field, so do they i
of water plants in the r
microscopic green plants
position of this excessi
mass of organic plant de
action subsequently depl
which in turn decreases
things in the water.

There are innumerab
pollution of surface wat
5-13 because it is a fam
received considerable pu
striking example of the

Activity 5-14 intro
involves two basic pheno
application, water of un
solids (e.g., salts and
vaporized. The resultin
condensed liquid is pure

The natural water c
Heat from the sun causes
the oceans. The heated
the air mass rises, it c
condensation occurs as r
Chart 5-2.

BACKGROUND INFORMATION FOR THE TEACHER (continued)

It is very important to realize that the problem of phosphate pollution is not one of toxicity. It is entirely related to its role as a plant nutrient. Just as various forms of soluble phosphates function as fertilizers on a field, so do they in the stream. The result may be a luxurious growth of water plants in the receiving lake or stream. As often as not, these are microscopic green plants called algae. It is the subsequent death and decomposition of this excessive algal growth that causes problems. The accumulated mass of organic plant debris is then attacked by microbes. This microbial action subsequently depletes the oxygen content of the surrounding water, which in turn decreases the oxygen supply for fish, plants, and other living things in the water.

There are innumerable types of unusual or unpredictable sources of pollution of surface waters. Oil has been selected for attention in Activity 5-13 because it is a familiar and identifiable material. Oil spills have received considerable public attention in recent years, and oil provides a striking example of the difficulty of environmental clean-up.

Activity 5-14 introduces the process of distillation. This process involves two basic phenomena - vaporization and condensation of water. In application, water of unknown quality is vaporized by heating. All dissolved solids (e.g., salts and other minerals) remain behind since these are not vaporized. The resulting water vapor is then condensed by chilling. The condensed liquid is pure water.

The natural water cycle in Activity 5-15 involves a very similar process. Heat from the sun causes the evaporation of water from the earth, especially the oceans. The heated air (now laden with water vapor) naturally rises. As the air mass rises, it cools. This cooling results in condensation. Such condensation occurs as rain or snow, returning the water to the earth. See Chart 5-2.

BSCS

Me and my Environment

UNIT V
CORE C

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in*
be prepared several days or weeks in advance. Use
a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	*(Itali*
5-11. The Invisible World Days needed: 2		Microscopes	Four
		Magnifying lenses	One per st
		Microscope slides	Twelve
		Worksheet 1-23	Microscope
	Salt crystals		One ounce,
	Feathers		Four
	Nylon stocking scraps		Four piece
5-12. Microbes in Water Days needed: 3	Pint jars		*Five; thes*
	Masking tape		For labeli
	Noniodized salt		Two tables
	Garden soil		Three tabl
	Dishwashing detergent		1/4 Teaspo
	Household bleach		One tables
	Motor oil		Two tables
	Hot plate or stove		
	Water		
		Test tubes, 13 X 100 mm	Six per pa
		Test tube racks	
		Methylene blue solution	Mix 10 dro of water
		Rubber stoppers, solid #00	For test t
		Measuring spoons	One set pe
		Medicine droppers	One per pa

PLANNING GUIDE

vities *(indicated in italics and an* ◄ *in the margin)* must
ed several days or weeks in advance. Use this summary as
g and preparation schedule. All supplies needed are listed.

BSCS

upplies Needed Materials in Supply Kit	Notes and Suggestions to Teacher *(Italics and Arrow Indicate Advance Preparation Directions)*
Microscopes	Four
Magnifying lenses	One per student
Microscope slides	Twelve
Worksheet 1-23	Microscope
	One ounce, or less
	Four
	Four pieces
	Five; these need not be identical
	For labeling
	Two tablespoons
	Three tablespoons
	1/4 Teaspoon
	One tablespoon
	Two tablespoons
Test tubes, 13 X 100 mm	Six per pair of students
Test tube racks	
Methylene blue solution	Mix 10 drops of methylene blue (from your kit) with 500 ml of water, one dropper bottle per student group
Rubber stoppers, solid #00	For test tubes
Measuring spoons	One set per pair of students
Medicine droppers	One per pair of students

Me and my · Environment

UNIT V
CORE C

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛
be prepared several days or weeks in advance. U
a teaching and preparation schedule. All suppli

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ita*
5-13. A Washday Miracle	Jars 1 and 2 from Activity 5-12		
Days needed: 4	Detergent packages, with phosphate content		*Several*
	Plant food or liquid fertilizer with phosphate content		One teas
	Plastic kitchen wrap		
	Rubber bands		
		"Green Water"	*Order fr*
		Beakers, 250 ml	Three pe
		Measuring spoons	One set
	Water treatment model		From Act
		Microscopes	Four
		Microscope slides	Eight
		Medicine droppers	Four
5-14. Oil in Water	Jar 4 from Activity 5-12		
Days needed: 2	Water treatment model		From Act
			Gather p *spills*
5-15. Distillation of Water	Hot plate		
	Water treatment model		From Act
Days needed: 2	Jars 3 and 5 from Activity 5-12		
	Ice		
	Water		

PLANNING GUIDE

ctivities (*indicated in italics and an* ↙ *in the margin*) must
pared several days or weeks in advance. Use this summary as
hing and preparation schedule. All supplies needed are listed.

BSCS

f Supplies Needed

	Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
y		
		Several brands
te		One teaspoon is sufficient
	"Green Water"	*Order from BSCS three weeks prior to this activity*
	Beakers, 250 ml	Three per student group
	Measuring spoons	One set per student group
		From Activity 5-9
	Microscopes	Four
	Microscope slides	Eight
	Medicine droppers	Four
		From Activity 5-9
		Gather pictures, newspaper clippings, and articles about oil spills and the various attempts to clean them up.
		From Activity 5-9, optional

Me and my Environment

UNIT V
CORE C

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in t* be prepared several days or weeks in advance. Use t a teaching and preparation schedule. All supplies n

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	*(Italics*
5-15. Distillation of Water (continued)		Flask, 250 ml	One
		Rubber stopper, 1-hole, #6	One
		Bent glass tube	One
		Test tubes	Six, any si
		Beaker, 1000 ml	One
		Test tube clamp	Six
		Vinyl tubing, 1/4 inch diameter	Twelve inch
5-16. Water Cycle Days needed: 2	Globe		One
	Ice		Approximatel
	Small stones		Several
	Gooseneck lamp		With 100-wat
	Plastic sandwich bags		
	Magazines, newspapers, catalogs		*These should a wide se*
	Scissors		One pair per
	Paste or glue		
	Large pieces of butcher paper or construction paper		One piece pe
	Water		
		Plastic sweater box	*One per clas*
		Chart 5-2, *Water Cycle in Nature*	
		Tallysheet 5-4	

PLANNING GUIDE

ities *(indicated in italics and an* ◀ *in the margin)* must
d several days or weeks in advance. Use this summary as
and preparation schedule. All supplies needed are listed.

BSCS

upplies Needed

Materials in Supply Kit	Notes and Suggestions to Teacher *(Italics and Arrow Indicate Advance Preparation Directions)*
Flask, 250 ml	One
Rubber stopper, 1-hole, #6	One
Bent glass tube	One
Test tubes	Six, any size
Beaker, 1000 ml	One
Test tube clamp	Six
Vinyl tubing, 1/4 inch diameter	Twelve inches to sixteen inches long
	One
	Approximately one tray
	Several
	With 100-watt bulb
	These should be collected before the activity to insure that a wide selection is on hand.
	One pair per student
	One piece per student
lastic sweater box	*One per class*
hart 5-2, *Water Cycle in Nature*	
allysheet 5-4	

BSCS

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Realize the problems associated with the preparation of usable water.

5. Recognize the impact of water pollution.

Core C Objectives for the Student:

1. Examine some specific contaminants of water.

ENVIRONMENTAL THEME:

Diversity and Patterns

INQUIRY SKILLS:

Observing, Describing

PROBLEM-SOLVING SKILLS:

Experimenting: Doing Something To See What Happens

PRACTICAL APPLICATION:

Manual Dexterity Skills, Experience with Delicate Equipment

Activity 5-11. The Invisible World

Examining the "invisible" world with a microscope will probably be a high point in the program for your students. Share in their enthusiasm as they discover the microscopic world.

ACTIVITY

Goals for the Student:

3. Realize the problems associated with the preparation of usable water.

5. Recognize the impact of water pollution.

C Objectives for the Student:

1. Examine some specific contaminants of water.

TAL THEME:
ity and Patterns

LLS:
ing, Describing

VING SKILLS:
menting: Doing Something To See
appens

PPLICATION:
Dexterity Skills, Experience with
te Equipment

The Invisible World

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BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE C.	PREPARATION OF USABLE WATER
ACTIVITY 5-11.	THE INVISIBLE WORLD

During this activity, each student should:

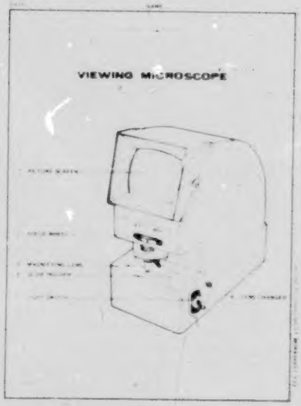
- *--identify each part of the microscope.*
- *--examine and describe salt crystals.*
- *--examine and describe salt crystals with a hand lens.*

ACTIVITY
5-11

MATERIALS

Microscopes, 4
Magnifying lenses, 1 per student
Microscope slides, 12
Worksheet 1-23
*Salt crystals, 1 ounce or less
*Feathers, 4
*Nylon stocking scraps, 4 pieces

Worksheet 1-23



*Not furnished in materials kit

TEACHING STRATEGIES

The first objects that students will view under their microscopes are salt crystals. What a microscope does and how it works will be demonstrated.

Since the microscope will be used several times in this core and later cores of this unit, this activity serves as an introduction to the microscope, how it works, and what it can be used for.

Begin by saying:

> WE HAVE BEEN USING OUR WATER TREATMENT MODEL TO CLEAN DIFFERENT SAMPLES OF WATER.
>
> COULD THERE POSSIBLY BE ANYTHING STILL IN THE CLEAN WATER THAT WE COULDN'T SEE?
>
> WHAT COULD WE USE TO SEE THESE VERY SMALL THINGS IN THE WATER?
>
> MICROSCOPES ARE USED BY PEOPLE WHO WORK IN LABORATORIES TO SEE MANY THINGS THAT CAN'T BE SEEN WITH THE EYE ALONE.

Hold up one of the microscopes and say:

> THIS IS ONE OF THE MICROSCOPES WE WILL USE TO TAKE A CLOSER LOOK AT SOME OF THE THINGS IN OUR WATER AND OUR AIR. A MICROSCOPE MUST BE HANDLED CAREFULLY, HOWEVER, SO BEFORE WE CAN LOOK WITH IT WE MUST LEARN TO USE IT PROPERLY.

Divide the class into groups and distribute a microscope to each group. Let the students examine it, but caution them not to turn on any switches or move any parts until directed to do so. Also distribute Worksheet 1-23, which pictures the microscope.

Go over each part of the microscope with the class so the become familiar with its parts and how they function. Begin the directions by saying:

TEACHING STRATEGIES

cts that students will view under their
e salt crystals. What a microscope does
ks will be demonstrated.

oscope will be used several times in this
cores of this unit, this activity serves
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g:

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, HOWEVER, SO BEFORE WE CAN LOOK WITH
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Let the students examine it, but caution
rn on any switches or move any parts until
so. Also distribute Worksheet 1-23, which
icroscope.

art of the microscope with the class so they
r with its parts and how they function.
ctions by saying:

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--examine and describe salt crystals with a microscope.*
- *--examine other objects with a microscope.*

Students should:

--respond, "Yes," "Maybe."

--respond, "Microscope," "Magnifying lens."

MATERIALS	TEACHING STRATEGIES
	AT THE TOP OF THE MICROSCOPE IS THE PICTURE SCREEN. IT IS MARKED NUMBER ONE ON THE MICROSCOPE DRAWING. IN ORDER TO SEE ANYTHING YOU MUST TURN ON THE MICROSCOPE LIGHT. TURN THE LIGHT SWITCH ON NOW. Allow each student to turn the switch on and off at least once. THE LIGHT IN THESE MICROSCOPES IS LIKE THAT IN A FLASH LIGHT - IT COMES FROM BATTERIES. Then ask: WHAT IS THE NUMBER OF THE LIGHT SWITCH ON THE MICROSCOPE DRAWING? Continue by saying: THE MICROSCOPE WILL WORK BEST WHEN THE LIGHT IS BRIGHT. WE CAN KEEP THE LIGHT BRIGHTER FOR A LONGER TIME IF WE TURN ON THE LIGHT AND USE THE BATTERIES ONLY WHEN WE ARE ACTUALLY LOOKING AT SOMETHING WITH THE MICROSCOPE. Check to see that all the lights are out before proceeding. Continue to remind the students from time to time that it is important to conserve the batteries. NOW HOW MANY CAN FIND THE MAGNIFYING LENS? IT'S NUMBER FOUR ON THE MICROSCOPE DRAWING. The microscope lens is obviously different from the magnifying lens the students have been using. Explain that, even though they can't see it, a tiny magnifier is inside the metal cylinder, and that it is strong enough

TEACHING STRATEGIES

OF THE MICROSCOPE IS THE PICTURE
IS MARKED NUMBER ONE ON THE MICRO-
NG.

SEE ANYTHING YOU MUST TURN ON THE
LIGHT. TURN THE LIGHT SWITCH ON NOW.

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N THESE MICROSCOPES IS LIKE THAT IN
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NUMBER OF THE LIGHT SWITCH ON THE
DRAWING?

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CAN KEEP THE LIGHT BRIGHTER FOR A
IF WE TURN ON THE LIGHT AND USE THE
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all the lights are out before
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CAN FIND THE MAGNIFYING LENS?
FOUR ON THE MICROSCOPE DRAWING.

ns is obviously different from the
he students have been using. Explain
they can't see it, a tiny magnifier is
cylinder, and that it is strong enough

ANTICIPATED STUDENT BEHAVIORS

Students should:

--turn on the microscope light.

--respond, "Number five."

--raise their hands.
--locate and identify the microscope lens.

MATERIALS

TEACHING STRATEGIES

to magnify things and make them many times bigger. Point out that the microscope actually has a choice of two lenses, one in a cylinder a little longer than the other. The shorter cylinder with its lens magnifies objects 50 times, the longer one 100 times. Check with each group to see that they have identified the lenses on both the microscope itself and on the drawing.

Continue by saying:

> IF A LABORATORY WORKER WANTS TO LOOK AT SOMETHING WITH A MICROSCOPE HE MUST FIRST PLACE IT ON A MICROSCOPE SLIDE.

Distribute a slide to each team. Caution them that since the slides are thin and made of glass, they will break easily. Also explain that the slides should be handled by the edges only. Otherwise the resulting smudges and finger prints will make things harder to see clearly.

Then say:

> ON EACH SIDE OF THE LENSES ARE TWO METAL CLIPS. (Point to them on a scope.) WHAT ARE THEY CALLED?

> If no one identifies the clips, say:
>
> THE METAL CLIPS ARE CALLED SLIDE HOLDERS AND ARE USED TO HOLD THE SLIDE IN PLACE UNDER THE LENS.

Demonstrate the proper way to put the slide in place and have the students put their slides in place. Check with each group to see that this has been done properly.

You may wish to review all of the parts so far mentioned before continuing. Terminology is not the important thing; rather, the students should know how the microscopes function.

TEACHING STRATEGIES

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a cylinder a little longer than the other.
linder with its lens magnifies objects 50
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RATORY WORKER WANTS TO LOOK AT SOMETHING
CROSCOPE HE MUST FIRST PLACE IT ON A
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ing. Terminology is not the important
the students should know how the micro-
.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--locate the clips on the microscope drawing and read, "Slide holders."

MATERIALS	TEACHING STRATEGIES
	Continue by saying: NOW THAT WE KNOW HOW OUR MICROSCOPE WORKS, IT IS TIME TO LOOK AT SOMETHING WITH IT. Distribute a few crystals of salt on a piece of dark paper. Ask: WHAT DOES THE SALT LOOK LIKE? Distribute a magnifying lens to each student and ask: WHAT DOES THE SALT LOOK LIKE UNDER THE MAGNIFIER? WHAT WOULD SALT LOOK LIKE IF IT WAS MAGNIFIED MORE AND WAS EVEN BIGGER? HOW COULD WE FIND OUT FOR SURE? Have each group add a few crystals of salt to the center of their slide. (You may find it best to add the salt yourself; otherwise, emphasize that only six to eight crystals are needed. These should be grouped together but not necessarily touching.) Next direct the students to place the slide on the microscope without spilling the salt. Then have them turn the light switch on. Say: TO BE SEEN, THE SALT MUST BE UNDER THE LENS, AND THE PICTURE OF THE SALT MUST BE IN FOCUS. TO BE IN FOCUS MEANS THE PICTURE MUST BE SHARP AND CLEAR. TURNING THE FOCUS WHEEL BACK AND FORTH

TEACHING STRATEGIES

:

NOW HOW OUR MICROSCOPE WORKS, IT
OK AT SOMETHING WITH IT.

rystals of salt on a piece of dark

SALT LOOK LIKE?

fying lens to each student and ask:

SALT LOOK LIKE UNDER THE

LT LOOK LIKE IF IT WAS MAGNIFIED
EVEN BIGGER?

FIND OUT FOR SURE?

d a few crystals of salt to the center
You may find it best to add the salt
e, emphasize that only six to eight
d. These should be grouped together
y touching.) Next direct the students
on the microscope without spilling the
hem turn the light switch on.

HE SALT MUST BE UNDER THE LENS, AND
THE SALT MUST BE IN FOCUS. TO BE
THE PICTURE MUST BE SHARP AND
NG THE FOCUS WHEEL BACK AND FORTH

ANTICIPATED STUDENT BEHAVIORS

Students should:

--describe the salt as being round, white, sparkly and so forth.

--describe what the salt looks like to them.

--speculate as to the probable appearance.

--respond, "Use the microscope," "Look at it with the microscope."

MATERIALS

TEACHING STRATEGIES

> LETS US MAKE THE PICTURE CLEAR. CAN YOU FIND THE FOCUS WHEEL ON YOUR MICROSCOPES AND ON THE DRAWINGS? (Point to the focus wheel on one of the scopes.)

From this point on, the students' ability to center the object and obtain the sharpest and clearest picture possible is a matter of experience. Let each group "fiddle" with the scope and move their slides if necessary. Give assistance if no progress is made.

When viewing objects with the scope, a darkened or semi-darkened room helps. If it is not possible to adjust the light in the room (and room light is affectin the quality of the picture), a light shade can be constructed of dark paper or cardboard and taped around the top of the scope to form a hood.

When the students have had an opportunity to view the salt crystals, ask:

> WHAT DO SALT CRYSTALS LOOK LIKE UNDER A MICROSCOPE?

> HOW DO THEY LOOK COMPARED TO THOSE SEEN WITH THE HAND MAGNIFIER?

If the students are interested in using the higher power lens, let them do so. Simply move the "lens changer" lever (Number 3 on the microscope diagram) to the right until the longer lens is in position.

Interest should be high at this point, and the students will be eager to look at other things. Pieces of feather and nylon stocking will work well, although any number of other things can be substituted. The only

TEACHING STRATEGIES

KE THE PICTURE CLEAR. CAN YOU FIND THE
L ON YOUR MICROSCOPES AND ON THE
(Point to the focus wheel on one of
.)

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on the microscope diagram) to the
longer lens is in position.

be high at this point, and the students
look at other things. Pieces of
on stocking will work well, although any
things can be substituted. The only

ANTICIPATED STUDENT BEHAVIORS

Students should:

--observe and locate the focus wheel on their microscopes and on their worksheet drawings.

--describe the appearance of magnified salt crystals.

--respond, "They look bigger," "They have a funny shape."

MATERIALS	TEACHING STRATEGIES
	criterion is that light must pass through the object if it is to be viewed. If any liquid is viewed, caution the students not to lower the lens onto the liquid but only far enough to focus properly. Liquid on the lens will cause smearing and make it difficult to view anything. Encourage and help the students in describing other objects they look at. Have them note the differences and similarities among these things. Conclude the activity by asking: ARE THE OBJECTS WE ARE LOOKING AT A PART OF OUR ENVIRONMENT? HOW DOES THE MICROSCOPE HELP US LEARN ABOUT OUR ENVIRONMENT? WE WILL USE THE MICROSCOPE MANY TIMES WHILE WE ARE LEARNING ABOUT AIR AND WATER. THEY WILL BE STORED ___________. (Designate the storage area.) YOU MAY USE THE MICROSCOPE TO LOOK AT SOMETHING AT ANY TIME, BUT BE VERY CAREFUL TO USE IT PROPERLY.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
light must pass through the object if d. If any liquid is viewed, caution to lower the lens onto the liquid but o focus properly. Liquid on the lens ng and make it difficult to view	
p the students in describing other at. Have them note the differences among these things.	
vity by asking:	
CTS WE ARE LOOKING AT A PART OF OUR	--recognize that the things being viewed are found around them and respond, "Yes."
MICROSCOPE HELP US LEARN ABOUT ENT?	--respond, "It makes things bigger," "You can see things you didn't know were there."
THE MICROSCOPE MANY TIMES WHILE WE ABOUT AIR AND WATER. THEY WILL ________. (Designate the storage MAY USE THE MICROSCOPE TO LOOK AT ANY TIME, BUT BE VERY CAREFUL TO RLY.	
	Upon completion of this activity, each student should, as a minimum: *--be able to use the microscope.* *--have examined salt crystals with the microscope.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE C
ACTIVITY 5-11

Teacher ____________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes preparing for each day's science class						
4. Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Were the instructions given to the students adequate for them to properly use the microscope? ☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the instructions given to the students adequate for them to properly use the microscope? ☐ Yes ☐ No

13. Did any students have problems using the microscope? ☐ Yes ☐ No If so, what types of problems did they have?

Side A

UNIT V, CORE C
ACTIVITY 5-11

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Realize the problems associated with the preparations of usable water.

6. Understand the broad problems of water management.

Core C Objectives for the Student:

1. Examine some specific contaminants of water.

2. ~~Examine some techniques~~ required to remove these contaminants.

4. Establish water as a finite resource.

ENVIRONMENTAL THEME:

Finiteness of Resources, Ecological Trade-offs

INQUIRY SKILLS:

Identifying

PROBLEM-SOLVING SKILLS:

Experimenting

PRACTICAL APPLICATION:

Knowing the Limitations of Boiling Water in Preparation for Drinking, Motor Coordination, Understanding Why There Must Be a Price on Water, Following Directions

TIVITY

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Realize the problems associated with the preparations of usable water.

Understand the broad problems of water management.

Objectives for the Student:

Examine some specific contaminants of water.

Examine some techniques required to remove these contaminants.

Establish water as a finite resource.

L THEME:
ess of Resources, Ecological Trade-offs

LS:
ying

ING SKILLS:
enting

PLICATION:
the Limitations of Boiling Water in
tion for Drinking, Motor Coordination,
anding Why There Must Be a Price on
Following Directions

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE C.	PREPARATION OF USABLE WATER
ACTIVITY 5-12.	MICROBES IN WATER

MATERIALS

Dropper bottles
Small Beaker
Test tubes, 6 per student group, 13 X 100 mm
Test tube racks
Methylene blue (oxygen test solution) (See Planning Guide)
Rubber stoppers, solid #00
Measuring spoons
Medicine dropper
*Noniodized salt
*Garden soil
*Dishwashing detergent
*Household bleach
*Motor oil
*Hot plate or stove
*Water
*Masking tape
*Pint jars, 5 (these need not be identical)

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-12. Microbes in Water

This activity will be the first in a series of investiga- tions on how to prepare drinkable water. The students have already studied and constructed a water treatment plant. They will now begin to identify various impuriti in water and use techniques to get rid of them. In this activity, methylene blue will be used to determine the effectiveness of boiling in eliminating bacteria from water. This can be directly related to the value of boiling as a sterilizing technique and will demonstrate one method of purifying water.

At the beginning of the class period, ask student volun- teers to prepare five pint jars as follows:

Jar 1. Add one-fourth teaspoon of dishwashing detergent and one tablespoon of garden soil. Fill almost full of tap water and mix.

(Be sure to wash the tablespoon between each use.)

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Jar 2. Mix tap water with one tablespoon of bleach and one tablespoon of garden soil.

SAV
ACT

TEACHING STRATEGIES

. Microbes in Water

will be the first in a series of investiga-
to prepare drinkable water. The students
studied and constructed a water treatment
will now begin to identify various impurities
use techniques to get rid of them. In this
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of boiling in eliminating bacteria from
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are five pint jars as follows:

one-fourth teaspoon of dishwashing
ergent and one tablespoon of garden
l. Fill almost full of tap water and
.

sure to wash the tablespoon between each
)

SAVE THIS FOR
ACTIVITY 5-13

tap water with one tablespoon of bleach
one tablespoon of garden soil.

SAVE THIS FOR
ACTIVITY 5-13

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--recall that microbes are living things.
--participate in a group to set up the experiment with five kinds of water and a control.
--predict the results of the experiment.
--observe the results and compare them with the predictions.
--conclude that boiling a water sample kills the microbes present but does not take away other substances in the water.

MATERIALS	TEACHING STRATEGIES
	Jar 3. Mix tap water with one tablespoon of garden soil. Jar 4. Mix tap water with two tablespoons of motor oil. Jar 5. Mix tap water with two tablespoons of noniodized salt. Label the jars and their contents one through five. Ask: WHAT IS IN JAR 1? WHAT IS IN JAR 2? Continue in a similar manner until the contents of all five jars have been identified.

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TEACHING STRATEGIES

water with one tablespoon of garden

SAVE THIS FOR
ACTIVITY 5-13

water with two tablespoons of
il.

SAVE THIS FOR
ACTIVITY 5-14

water with two tablespoons of
ed salt.

SAVE THIS FOR
ACTIVITY 5-15

their contents one through five.

R 1?

R 2?

lar manner until the contents of all
n identified.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--identify the contents of Jar 1 as detergent, soil, and water.

--identify the contents of Jar 2 as bleach, soil, and water.

ACTIVITY
5-12

MATERIALS

TEACHING STRATEGIES

WOULD THE WATER IN ANY OF THESE JARS BE CLEAN ENOUGH TO DRINK?

WHEN WE WENT TO THE WATER TREATMENT PLANT AND WHEN WE BUILT OUR OWN PLANT, WE SAW HOW TO MAKE WATER SO IT'S GOOD ENOUGH TO DRINK. DO YOU REMEMBER HOW OUR WATER IS CLEANED?

NOW WE'RE GOING TO BEGIN TO FIND OUT WHAT KINDS OF HARMFUL THINGS GET INTO OUR WATER AND HOW WE CAN GET THEM OUT.

WHAT ARE SOME THINGS THAT GET INTO OUR WATER?

IS THERE ANY LIVING THING THAT COULD BE IN OUR WATER THAT WE CAN SEE ONLY THROUGH A MICROSCOPE?

WHAT WAS ONE WAY WE FOUND WE CAN KILL MICROBES?

DO WE HAVE ANY REAL PROOF THAT THERE ARE NO MICROBES LIVING IN THE WATER IF WE BOIL IT? HOW DO WE KNOW THAT THEY'RE NOT IN THE WATER?

CAN YOU LIVE IN BOILING WATER?

DO YOU THINK MICROBES CAN LIVE IN BOILING WATER?

LET'S TRY TO FIND OUT IF MICROBES CAN LIVE IN BOILING WATER.

ARE MICROBES LIVING THINGS?

WHAT DO ALL LIVING THINGS NEED?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HE WATER IN ANY OF THESE JARS BE CLEAN TO DRINK?	--respond, "No!" "It's dirty," "We'd get sick," "It would taste bad."
WENT TO THE WATER TREATMENT PLANT AND BUILT OUR OWN PLANT, WE SAW HOW TO MAKE D IT'S GOOD ENOUGH TO DRINK. DO YOU R HOW OUR WATER IS CLEANED?	--recall the process used to clean water.
RE GOING TO BEGIN TO FIND OUT WHAT KINDS UL THINGS GET INTO OUR WATER AND HOW WE THEM OUT.	
SOME THINGS THAT GET INTO OUR WATER?	--suggest such things as dirt, bugs, leaves, microbes, rain, and so forth.
ANY LIVING THING THAT COULD BE IN OUR AT WE CAN SEE ONLY THROUGH A MICROSCOPE?	--recall the activities in Units II and IV and respond, "Microbes."
ONE WAY WE FOUND WE CAN KILL MICROBES?	--recall the boiling activities in Activity 2-6 and and Activity 2-8 and respond, "By boiling."
VE ANY REAL PROOF THAT THERE ARE NO LIVING IN THE WATER IF WE BOIL IT? E KNOW THAT THEY'RE NOT IN THE WATER?	--respond, "I don't know," "We just know," "We did an experiment."
LIVE IN BOILING WATER?	--respond, "No."
HINK MICROBES CAN LIVE IN BOILING WATER?	--respond, "No."
Y TO FIND OUT IF MICROBES CAN LIVE IN WATER.	
OBES LIVING THINGS?	--recall that microbes are living things.
ALL LIVING THINGS NEED?	--recall that ~~living~~ things need food, air, and water.

MATERIALS

TEACHING STRATEGIES

ARE THERE ANY MICROBES THAT LIVE IN WATER?

IS THERE ANY AIR IN WATER?

ARE MICROBES ABLE TO GET AIR FROM WATER?

> If students do not seem to understand this, help them to realize that water contains dissolved air by asking:
>
> ARE FISH LIVING THINGS?
>
> DO THEY NEED AIR IN ORDER TO LIVE?
>
> ARE FISH ABLE TO GET AIR FROM THE WATER THEY BREATHE?
>
> THEN IS AIR PRESENT IN WATER?
>
> WATER CONTAINS AIR THAT CERTAIN LIVING THINGS ARE ABLE TO BREATHE. MANY MICROBES ARE ABLE TO GET THE AIR THEY NEED IN THIS WAY.

Now ask:

WHAT WOULD HAPPEN TO THE AIR THAT IS IN THE WATER IF THERE WERE A LOT OF MICROBES IN THE WATER?

CAN ANYONE REMEMBER WHAT A TEST SOLUTION IS?

Assist the students in recalling the test solutions used previously. The solutions used have been a starch test

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
Y MICROBES THAT LIVE IN WATER?	--recall that microbes do live in water.
AIR IN WATER?	--respond, "Yes," "No," "I don't know."
ABLE TO GET AIR FROM WATER?	--infer that the microbes in water must be able to get air if they are living.
ents do not seem to understand this, em to realize that water contains ed air by asking:	
H LIVING THINGS?	--respond, "Yes."
NEED AIR IN ORDER TO LIVE?	--respond, "Yes."
H ABLE TO GET AIR FROM THE WATER EATHE?	--respond, "Yes."
AIR PRESENT IN WATER?	--respond, "Yes."
ONTAINS AIR THAT CERTAIN LIVING THINGS E TO BREATHE. MANY MICROBES ARE ABLE THE AIR THEY NEED IN THIS WAY.	
APPEN TO THE AIR THAT IS IN THE RE WERE A LOT OF MICROBES IN THE	--infer that if there were more microbes, more oxygen would be used, therefore, less oxygen would be left in the water.
EMEMBER WHAT A TEST SOLUTION IS?	--recall the use of the starch test solution in Activity 3-21 and the carbon dioxide test solution in Activity 4-12 and respond, "You use it to see if something is there."
s in recalling the test solutions used olutions used have been a starch test	

solution (turns black if starch is present) and a carbo
dioxide test solution (turns yellow if carbon dioxide i
present).

TODAY WE WILL USE ANOTHER TEST SOLUTION.

Write the following on the chalkboard:

OXYGEN TEST SOLUTION

Blue = much oxygen

No Color = not much oxygen

Say:

OXYGEN IS WHAT MAKES UP PART OF OUR AIR. IN THIS ACTIVITY WE ARE GOING TO USE AN OXYGEN TEST SOLUTION TO SEE HOW MUCH OXYGEN IS PRESENT IN WATER. THE TEST SOLUTION IS BLUE IN WATER WITH A LOT OF OXYGEN, BUT HAS NO COLOR WHEN THERE IS NOT MUCH OXYGEN IN THE WATER.

Direct the student pairs to obtain the following materia
from the supply table:

- 6 test tubes
- masking tape
- oxygen test solution
- 6 rubber stoppers
- test tube rack
- small beaker

Set the five jars of water on a table and place a medicine dropper next to each jar. Give the following

TEACHING STRATEGIES

ns black if starch is present) and a carbon
solution (turns yellow if carbon dioxide is

WILL USE ANOTHER TEST SOLUTION.

lowing on the chalkboard:

EST SOLUTION

: = much oxygen

Color = not much oxygen

WHAT MAKES UP PART OF OUR AIR. IN
VITY WE ARE GOING TO USE AN OXYGEN
TION TO SEE HOW MUCH OXYGEN IS PRESENT
THE TEST SOLUTION IS BLUE IN WATER
T OF OXYGEN, BUT HAS NO COLOR WHEN
NOT MUCH OXYGEN IN THE WATER.

HAVE STUDENTS
WORK IN PAIRS

dent pairs to obtain the following materials
y table:

solution
ppers
ck

ars of water on a table and place a
er next to each jar. Give the following

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES

directions to the students, allowing them time to perform the task before proceeding to the next direction.

USING MASKING TAPE, NUMBER FIVE TEST TUBES AND PUT YOUR NAMES ON THEM.

USING MEDICINE DROPPERS, OBTAIN A WATER SAMPLE FROM EACH OF THE FIVE JARS. DO NOT MIX MEDICINE DROPPERS BETWEEN TEST TUBES. MATCH THE TEST TUBE NUMBER WITH THE JAR NUMBER. FILL EACH TUBE ONE-HALF FULL, MAKING SURE ALL TUBES ARE FILLED TO THE SAME LEVEL.

When students have their test tubes filled, say:

PUT TEN DROPS OF OXYGEN TEST SOLUTION IN EACH OF THE FIVE TEST TUBES.

STOPPER EACH TUBE WITH A SOLID RUBBER STOPPER. TIP THE TUBE ONCE TO MIX THE WATER AND TEST SOLUTION. PUT ALL THE TEST TUBES IN A TEST TUBE RACK.

Then ask:

WHAT COLOR IS THE WATER IN EACH TUBE?

WHICH TUBE DO YOU PREDICT WILL REMAIN BLUE?

Write the students' predictions on the chalkboard.

Ask:

WHY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
students, allowing them time to before proceeding to the next direction.	
G TAPE, NUMBER FIVE TEST TUBES AND ES ON THEM.	--number five test tubes and put their names on the test tubes.
NE DROPPERS, OBTAIN A WATER EACH OF THE FIVE JARS. DO CINE DROPPERS BETWEEN TEST H THE TEST TUBE NUMBER WITH ER. FILL EACH TUBE ONE-HALF SURE ALL TUBES ARE FILLED LEVEL.	--fill the test tubes, compare water levels and adjust accordingly.
e their test tubes filled, say:	
S OF OXYGEN TEST SOLUTION IN EACH TEST TUBES.	--follow the lab procedure as directed.
TUBE WITH A SOLID RUBBER STOPPER. ONCE TO MIX THE WATER AND TEST UT ALL THE TEST TUBES IN A TEST	--stopper and mix the contents of the test tubes.
S THE WATER IN EACH TUBE?	--respond, "Blue."
D YOU PREDICT WILL REMAIN BLUE?	--make a guess as to which test tubes will remain blue.
s' predictions on the chalkboard.	
	--expect that if no microbes are present no oxygen will be used up.

ACTIVITY
5-12

MATERIALS

TEACHING STRATEGIES

> HOW COULD WE GET A WATER SAMPLE THAT HAS NO MICROBES IN IT SO WE HAVE SOMETHING TO COMPARE WITH THE OTHER TEST TUBE WATER SAMPLES?

Boil some tap water and allow it to cool. Pour some boiled water into the small beaker that each student pai should have. Instruct the students to:

1. Pour some water into Test Tube 6.
2. Add ten drops of oxygen test solution.
3. Put a thumb over the top and tip the test tube.
4. Stopper the tube with a rubber stopper.
5. Put the test tube in the test tube rack.

When all of the test tubes have been prepared and set aside, ask:

> WHAT ARE WE TRYING TO FIND OUT BY DOING THIS EXPERIMENT?

Allow the water samples to remain in the test tubes for one to three days. Results should begin to be visible within twenty-four hours. Instruct students to observe the test tubes each day until a definite change is visible.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
E GET A WATER SAMPLE THAT HAS NO IT SO WE HAVE SOMETHING TO COMPARE HER TEST TUBE WATER SAMPLES?	--recall the boiling activities (2-6 and 2-8) and infer that boiled water should be used to check these results (as a control).
ter and allow it to cool. Pour some o the small beaker that each student pair struct the students to:	
water into Test Tube 6.	
ops of oxygen test solution.	
b over the top and tip the test tube.	
e tube with a rubber stopper.	
st tube in the test tube rack.	--follow the lab procedure as directed.
test tubes have been prepared and set	
TRYING TO FIND OUT BY DOING THIS	--respond, "If boiling water kills microbes," "If the microbes use up all the oxygen," "What kind of water has microbes in it," and so forth.
samples to remain in the test tubes for s. Results should begin to be visible r hours. Instruct students to observe ch day until a definite change is	--observe and record results.

WAITING TIME

MATERIALS	TEACHING STRATEGIES
	When the color of one or more of the test tubes has changed from blue to colorless, the activity will be ready to continue. At that time, ask: WERE YOUR PREDICTIONS CORRECT? WHAT TEST TUBES REMAINED BLUE? WHY DID THEY STAY BLUE? HOW DO WE KNOW THAT THIS IS WHAT HAPPENS TO THE WATER WHEN THERE ARE NO MICROBES IN IT? WHAT KILLED THE MICROBES IN OUR CONTROL TUBE? WHAT KEPT THE MICROBES FROM LIVING IN THESE TEST TUBES THAT STAYED BLUE? IF WE BOILED THE BLEACH WATER OR THE SALT WATER OR THE OIL WATER WOULD IT BE SAFE TO DRINK? WHY NOT? BOILING KILLS MICROBES. WHAT HAVE WE FOUND OUT BY DOING THIS EXPERIMENT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
f one or more of the test tubes has e to colorless, the activity will be e.	
k:	
REDICTIONS CORRECT?	--respond, "Yes," "No," "Some were."
BES REMAINED BLUE?	--probably reply by naming Test Tubes 2, 4, and 5 (bleach/soil, oil, and salt solutions).
STAY BLUE?	--respond, "They had no microbes in them," "The bleach killed any microbes."
OW THAT THIS IS WHAT HAPPENS TO THE HERE ARE NO MICROBES IN IT?	--recall the preparation of boiling water as the control, and reply, "Because we boiled water and that is what it looked like."
THE MICROBES IN OUR CONTROL TUBE?	--respond, "Boiling the water."
E MICROBES FROM LIVING IN THESE HAT STAYED BLUE?	--respond, "The bleach," "The stuff we mixed with the water kept them from growing."
THE BLEACH WATER OR THE SALT OIL WATER WOULD IT BE SAFE TO DRINK?	--respond, "No."
ILING KILLS MICROBES.	--respond, "It doesn't take the other stuff out."
FOUND OUT BY DOING THIS	--respond, "Boiling water will take microbes out of water, but not everything else," "Bleach keeps microbes from growing," "Microbes need air," and so forth.

ACTIVITY
5-12

MATERIALS

TEACHING STRATEGIES

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have participated in a group which set up the experiment.*
- *--be able to describe boiling water as one way to kill microbes.*

MATERIALS	TEACHING STRATEGIES
	When the color of one or more of the test tubes has changed from blue to colorless, the activity will be ready to continue. At that time, ask: WERE YOUR PREDICTIONS CORRECT? WHAT TEST TUBES REMAINED BLUE? WHY DID THEY STAY BLUE? HOW DO WE KNOW THAT THIS IS WHAT HAPPENS TO THE WATER WHEN THERE ARE NO MICROBES IN IT? WHAT KILLED THE MICROBES IN OUR CONTROL TUBE? WHAT KEPT THE MICROBES FROM LIVING IN THESE TEST TUBES THAT STAYED BLUE? IF WE BOILED THE BLEACH WATER OR THE SALT WATER OR THE OIL WATER WOULD IT BE SAFE TO DRINK? WHY NOT? BOILING KILLS MICROBES. WHAT HAVE WE FOUND OUT BY DOING THIS EXPERIMENT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
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NOW THAT THIS IS WHAT HAPPENS TO THE THERE ARE NO MICROBES IN IT?	--recall the preparation of boiling water as the control, and reply, "Because we boiled water and that is what it looked like."
THE MICROBES IN OUR CONTROL TUBE?	--respond, "Boiling the water."
HE MICROBES FROM LIVING IN THESE THAT STAYED BLUE?	--respond, "The bleach," "The stuff we mixed with the water kept them from growing."
THE BLEACH WATER OR THE SALT OIL WATER WOULD IT BE SAFE TO DRINK?	--respond, "No."
ILING KILLS MICROBES.	--respond, "It doesn't take the other stuff out."
FOUND OUT BY DOING THIS	--respond, "Boiling water will take microbes out of water, but not everything else," "Bleach keeps microbes from growing," "Microbes need air," and so forth.

ACTIVITY
5-12

MATERIALS

TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Upon completion of this activity, each student should, as a minimum: *--have participated in a group which set up the experiment.* *--be able to describe boiling water as one way to kill microbes.*

UNIT V, CORE C
ACTIVITY 5-12

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the instructions regarding the experiment sufficiently clear? ☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the instructions regarding the experiment sufficiently clear? ☐ Yes ☐ No

13. Did students have any problems in conducting the experiment? ☐ No ☐ Yes
If so, what problems did they have?

Side A

UNIT V, CORE C
ACTIVITY 5-12

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Realize the problems associated with the preparation of usable water.

4. Realize the problems associated with the disposal of waste water.

5. Recognize the impact of water pollution.

6. Understand the broad problems of water management.

Core C Objectives for the Student:

1. Examine some specific contaminants of water.

2. Examine some techniques required to remove these contaminants.

4. Establish water as a finite resource.

ENVIRONMENTAL THEME:

Finiteness of Resources, Ecological Trade-offs

INQUIRY SKILLS:

Comparing

PROBLEM-SOLVING SKILLS:

Identifying Variables

PRACTICAL APPLICATION:

What Products Are Better To Use in Daily Life, Making a Judgment, Manipulating Items, Working in a Group

TIVITY

als for the Student:

Realize the problems associated with the preparation of usable water.

Realize the problems associated with the disposal of waste water.

Recognize the impact of water pollution.

Understand the broad problems of water management.

Objectives for the Student:

Examine some specific contaminants of water.

Examine some techniques required to remove these contaminants.

Establish water as a finite resource.

L THEME:
ess of Resources, Ecological Trade-offs

LS:
ng

ING SKILLS:
ying Variables

PLICATION:
oducts Are Better To Use in Daily Life,
a Judgment, Manipulating Items,
in a Group

BSCS

UNIT V. AIR AND WATER IN
MY ENVIRONMENT

CORE C. PREPARATION OF
USABLE WATER

ACTIVITY 5-13. A WASHDAY MIRACLE

ACTIVITY
5-13

MATERIALS

Jars 1 and 2 from Activity 5-12
250 ml Beakers, 3 per student group
Teaspoon measure, 1 per student group
Water treatment model from Activity 5-9
Microscopes, 4
Microscope slides, 8
Medicine droppers, 4
*Plastic kitchen wrap
*Rubber bands
*Detergent packages, 4 (various brands) with phosphate content
*Liquid plant food
*"Green water" (to be ordered three weeks prior to activity

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-13. A Washday Miracle

This activity is the second of several activities deali with taking specific pollutants out of the water to make it drinkable. The emphasis of this activity will be on the problem of purifying water containing detergents.

Teacher Preparation:

1. Jars 1 and 2 from Activity 5-12 will be used.

2. To insure the success of this activity, it will be especially important to obtain a detergent with phosphates. If you are in an area that has forbidden the use of detergents with phosphates, this activity might have to be omitted or altered.

3. Be sure to order the "green water" needed for this activity three weeks prior to the time you begin.

Begin by saying:

TEACHING STRATEGIES

A Washday Miracle

is the second of several activities dealing
pecific pollutants out of the water to make
The emphasis of this activity will be on
f purifying water containing detergents.

ration:

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n the use of detergents with phosphates,
ivity might have to be omitted or altered.

to order the "green water" needed for
ivity three weeks prior to the time you

g:

ANTICIPATED STUDENT BEHAVIORS

During this activity, __each__ __student__ should:

- *--observe Jars 1 and 2 and make a prediction about the effectiveness of the water treatment plant in cleaning these water samples.*
- *--observe the effect of the water treatment plant on the water from Jars 1 and 2 and conclude that detergents were not removed from the water.*
- *--observe the contents listed on the boxes of detergents and commercial plant food.*
- *--identify phosphate as a common ingredient in detergent and plant food.*
- *--realize that phosphate is an ingredient that encourages plant growth.*
- *--observe "green water" under the microscope.*
- *--participate in setting up an experiment to test the effects of detergents on the growth of algae.*
- *--identify Beaker 3 as a control.*
- *--observe the results of the experiment and conclude that detergents enhance algae growth.*
- *--relate the results of the experiment to the problems of water pollution and treatment.*

MATERIALS

TEACHING STRATEGIES

WHAT DID WE DO IN OUR LAST ACTIVITY TO GET RID OF MICROBES IN WATER?

DOES BOILING OUR WATER GET RID OF ALL THOSE THINGS THAT WE DON'T WANT IN IT?

Place Jars 1 and 2 from Activity 5-12 on the table.

Ask:

HERE ARE TWO OF THE JARS OF WATER FROM OUR LAST ACTIVITY. WHAT IS IN THE WATER IN THESE JARS?

HOW HAVE THE CONTENTS OF THESE JARS CHANGED OVER THE PAST FEW DAYS?

GIVE STU
TIME
TO
THINK

HOW COULD WE GET THE DETERGENT AND BLEACH OUT OF THE WATER SO IT WOULD BE SAFE TO DRINK?

WOULD BOILING THE WATER TAKE OUT THE DETERGENT AND BLEACH?

WHAT WOULD HAPPEN IF WE PUT THE WATER FROM THESE JARS THROUGH OUR WATER TREATMENT PLANT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
DO IN OUR LAST ACTIVITY TO GET RID IN WATER?	--recall Activity 5-12 and reply, "Boil the water."
G OUR WATER GET RID OF ALL THOSE WE DON'T WANT IN IT?	--respond, "No, just microbes."
2 from Activity 5-12 on the table.	
O OF THE JARS OF WATER FROM OUR TY. WHAT IS IN THE WATER IN THESE	--recall the preparation of the water, read the labels of the jars, and reply, "Bleach and dirt," "Detergent and soil."
E CONTENTS OF THESE JARS CHANGED ST FEW DAYS?	--respond, "No change," "Less suds," "Maybe more cloudy or green," "I can't smell the bleach."

GIVE STUDENTS
TIME
TO
THINK

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
E GET THE DETERGENT AND BLEACH OUT R SO IT WOULD BE SAFE TO DRINK?	--suggest such things as boiling, putting it through the treatment plant, and so forth.
NG THE WATER TAKE OUT THE DETERGENT	--respond, "No," "It just kills microbes."
HAPPEN IF WE PUT THE WATER FROM THROUGH OUR WATER TREATMENT PLANT?	--predict that the water treatment plant would, "Clean up the water," "Take the suds out."

MATERIALS

TEACHING STRATEGIES

Allow the students to test their predictions by running samples through the water treatment plant.

Then ask:

> HOW CAN WE TELL IF THE SUDS ARE STILL IN THE WATER?
>
> WHAT DO YOU OBSERVE?
>
> DO YOU SUPPOSE THERE IS ANYTHING ELSE IN THE DETERGENT THAT COULD COME THROUGH THE WATER TREATMENT PLANT?
>
> HOW COULD WE FIND OUT WHAT IS IN DETERGENT?

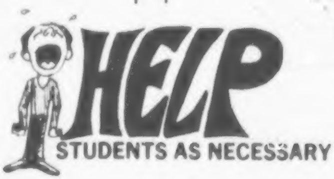
Distribute the boxes of phosphate detergents you have obtained. Allow the students to read the labels on the detergent boxes. Help with the vocabulary as needed. Also have students read the labels on a container of liquid plant food.

List the ingredients of both the detergents and the plant food on the chalkboard.

Ask:

> IS THERE ANY INGREDIENT THAT IS THE SAME IN THE DETERGENT AND THE PLANT FOOD?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
nts to test their predictions by running the water treatment plant.	
TELL IF THE SUDS ARE STILL IN THE	--suggest shaking the contents of the jars.
U OBSERVE?	--observe suds in the water.
POSE THERE IS ANYTHING ELSE IN THE THAT COULD COME THROUGH THE WATER PLANT?	--respond, "I don't know," "I can't see anything," "I doubt it."
WE FIND OUT WHAT IS IN DETERGENT?	
boxes of phosphate detergents you have w the students to read the labels on the . Help with the vocabulary as needed. nts read the labels on a container of [illegible]	



ients of both the detergents and the plant lkboard.	
NY INGREDIENT THAT IS THE SAME IN ENT AND THE PLANT FOOD?	--indicate, "Yes," "Phosphate."

MATERIALS	TEACHING STRATEGIES

NOTE: The ingredients listed on both the box of detergent and the plant food should include phosphates or some chemical with the word phosphate in it.

PHOSPHATE IS A CHEMICAL THAT HELPS PLANTS TO GROW.

IF PHOSPHATES ARE A PLANT FOOD, AND PHOSPHATES ARE IN DETERGENTS, THEN WHAT EFFECT WOULD DETERGENTS HAVE ON PLANTS?

HOW COULD WE FIND OUT IF THIS IS TRUE?

Display a flask of green water and say:

THIS FLASK CONTAINS MILLIONS OF SMALLWATER PLANTS.

WHY CAN'T WE SEE ANY OF THE PLANTS?

WHAT COULD WE USE TO SEE THE PLANTS?

Divide the class into four groups. Distribute the microscopes. If necessary, review how to use them properly. Distribute a slide and a cover slip to each group. Place a small drop of green water in the center of the slide.

With one edge of the cover slip touching the drop of water, lower the cover slip very gently over the water and onto the slide. Following this procedure will help to eliminate any air bubbles that might be trapped under the cover slip.

Look at the green water with both lenses. Encourage students to describe what they see. Those students who show interest should be allowed to sketch or note what they see.

TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

Students should:

--infer that detergents would also act as a plant food.

--suggest feeding some detergent to plants.

--respond, "Because they're too small," "They're invisible."

--suggest using the microscope.

MATERIALS

TEACHING STRATEGIES

Continue by asking:

> WHAT DO YOU SEE IN THE GREEN WATER?
>
> HOW MANY THINGS DO YOU SEE?
>
> WHAT WOULD HAPPEN TO THESE TINY PLANTS IF WE PUT PLANT FOOD IN THE WATER?
>
> WOULD DETERGENTS BE A PLANT FOOD?
>
> WHY?
>
> LET'S TEST YOUR SUGGESTION TO FEED DETERGENTS TO PLANTS BY SETTING UP AN EXPERIMENT.

Ask students for suggestions on how to set up the experiment. Discuss each suggestion as to its practicality and effectiveness.

Distribute three beakers to each group and give the students the following directions, one at a time:

1. Number the beakers, 1, 2, and 3 and fill each with water.
2. Add one teaspoon of green water to each of the three beakers.
3. Add nothing else to Beaker 1.
4. Add one teaspoon of detergent to Beaker 2. (Have different students use different brands.)
5. Add one teaspoon of liquid plant food to Beaker 3.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
king:	
OU SEE IN THE GREEN WATER?	--describe what they see, probably saying, "Small shapes," "Small plants," "Little things," and so forth.
THINGS DO YOU SEE?	--respond, "Lots," "Millions."
D HAPPEN TO THESE TINY PLANTS IF WE FOOD IN THE WATER?	--respond, "They'd grow."
ERGENTS BE A PLANT FOOD?	--respond, "Yes."
	--respond, "Because it has that stuff in it," "Because there are phosphates in it."
T YOUR SUGGESTION TO FEED DETERGENTS TO SETTING UP AN EXPERIMENT.	
or suggestions on how to set up the experi- each suggestion as to its practicality ess.	
e beakers to each group and give the llowing directions, one at a time:	
e beakers, 1, 2, and 3 and fill each r.	
easpoon of green water to each of the kers.	
ng else to Beaker 1.	
easpoon of detergent to Beaker 2. ferent students use different brands.)	
easpoon of liquid plant food to Beaker 3.	

MATERIALS

TEACHING STRATEGIES

6. Cover each beaker with a piece of plastic wrap secured with a rubber band.

7. Place the beakers in a window sill or other sunlit place. If no window area is available, place beaker under a fluorescent lamp.

WHY DID WE ADD NOTHING TO THE GREEN WATER IN BEAKER 1?

HE
STUDENTS

Allow the beakers to remain in the sunlight (or under the lamp) for a week or more.

Agitate several times each day to stir the ingredients (the more often the better).

Continue with the remaining activities in this core while waiting for results. After about a week the water in Beakers 2 and 3 should be a deeper, richer green than the water in Beaker 1. This is because the phosphates in the detergent and the plant food have acted as a fertilizer and allowed abundant plant growth.

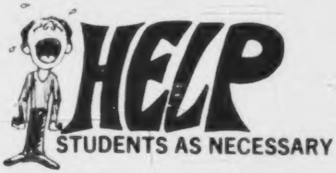
After about a week, ask:

TEACHING STRATEGIES

beaker with a piece of plastic wrap
th a rubber band.

beakers in a window sill or other sunlit
no window area is available, place
er a fluorescent lamp.

ADD NOTHING TO THE GREEN WATER IN



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WAITING TIME

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plant food have acted as a fertilizer
ant plant growth.

k, ask:

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recognize this beaker as a control and reply, "So we know what it looked like in the beginning," "So we know what would happen if nothing was added," "To compare the other beakers with."

MATERIALS

TEACHING STRATEGIES

WHAT WERE WE TRYING TO FIND OUT IN THIS EXPERIMENT?

HOW ARE THE BEAKERS DIFFERENT FROM WHEN WE BEGAN THE EXPERIMENT?

WHAT WAS IN THE GREEN WATER THAT WE PUT IN THE BEAKERS?

WHAT ARE PHOSPHATES?

WHAT WOULD IT MEAN IF THE WATER TURNED A DARKER GREEN?

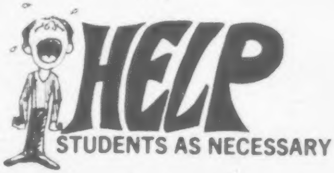
HOW COULD WE FIND OUT IF THERE REALLY ARE MORE PLANTS IN THE WATER?

Distribute the microscopes and slides and allow students to prepare a slide of the darker green water and examine it. Encourage description and comparison between the first drop of green water observed and this richer, deeper green water.

Students should be able to observe a denser population of plants in this water than were in the original green wate

Inform the students that these green plants are called algae and are the same kinds of plants they see in ponds and lakes.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
WE TRYING TO FIND OUT IN THIS ??	--reply, "To see if detergents are a plant food."
E BEAKERS DIFFERENT FROM WHEN WE EXPERIMENT?	--describe Beakers 2 and 3 as a darker green than they were when the experiment began.
N THE GREEN WATER THAT WE PUT IN S?	--reply, "Tiny, green plants."
HOSPHATES?	--reply, "A plant food."
IT MEAN IF THE WATER TURNED A EN?	--infer that there would be more tiny, green plants in the water.
WE FIND OUT IF THERE REALLY ARE MORE THE WATER?	--suggest using the microscope.
microscopes and slides and allow students ide of the darker green water and examine description and comparison between the reen water observed and this richer, ter.	



be able to observe a denser population of
water than were in the original green water.

ents that these green plants are called
e same kinds of plants they see in ponds

MATERIALS	TEACHING STRATEGIES
	WHAT WOULD HAPPEN IF MANY DETERGENTS FROM OUR HOUSES WENT INTO LAKES AND STREAMS NEARBY? WHAT EFFECT WOULD THIS HAVE ON WATER TREATMENT? During the discussion of the effect of plant growth in lakes and streams, and what this does to treatment plants, point out to the students that many types of algae have bad odors and tastes. These odors and tastes also have to be dealt with in treating water. They would probably necessitate another step in the treatment process. IF THE WATER TREATMENT PLANT WAS CLOGGED AND COULDN'T WORK, AND IF THE WATER TASTED AND SMELLED SO BAD THAT WE COULD NOT DRINK IT, WHAT WOULD HAPPEN? WHAT COULD YOU AS A PERSON DO TO KEEP THIS GREEN PLANT GROWTH FROM TAKING PLACE IN YOUR LAKES AND RIVERS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HAPPEN IF MANY DETERGENTS FROM OUR T INTO LAKES AND STREAMS NEARBY?	--predict that the detergents would cause the plants to grow.
T WOULD THIS HAVE ON WATER TREATMENT?	--predict that it would cost more and would take more time to run the water through a treatment plant; also, it would probably clog it up.
ussion of the effect of plant growth in ms, and what this does to treatment plants, e students that many types of algae have astes. These odors and tastes also have h in treating water. They would probably ther step in the treatment process.	
ER TREATMENT PLANT WAS CLOGGED AND DRK, AND IF THE WATER TASTED AND BAD THAT WE COULD NOT DRINK IT, HAPPEN?	--predict, "We'd have no water to drink," "We'd have to boil our water."
YOU AS A PERSON DO TO KEEP THIS T GROWTH FROM TAKING PLACE IN YOUR RIVERS?	--suggest not using phosphate detergent, not using as much detergent, and so forth.

Upon completion of this activity, each student should, as a minimum:

- *--have participated or observed the effect of running the contents of Jars 1 and 2 through the water treatment plant.*
- *--have observed "green water" under the microscope.*
- *--have participated in setting up the experiment.*
- *--recognize that some detergents cause many plants to grow.*
- *--state or indicate in some way that these detergents are not the best to use.*

MATERIALS

TEACHING STRATEGIES

See Change of Pacers 13, 14, and 15.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

CHANGE OF PACER

Pacers 13, 14, and 15.

UNIT V, CORE C
ACTIVITY 5-13

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ___ Tally ___ Rev ___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Were you able to obtain the materials for the experiment? ☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were you able to obtain the materials for the experiment? ☐ Yes ☐ No

13. Did the phosphate experiment work well? ☐ Yes ☐ No

14. Were students able to easily observe the change in the number of plants present in the "green water"? ☐ Yes ☐ No

Side A

UNIT V, CORE C
ACTIVITY 5-13

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Realize the problems associated with the preparation of usable water.

5. Recognize the impact of water pollution.

6. Understand the broad problems of water management.

Core C Objectives for the Student:

1. Examine some specific contaminants of water.

2. Examine some techniques required to remove these contaminants.

4. Establish water as a finite resource.

ENVIRONMENTAL THEME:

Finiteness of Resources, Ecological Trade-offs

INQUIRY SKILLS:

Speculating

PROBLEM-SOLVING SKILLS:

Drawing Conclusions

PRACTICAL APPLICATION:

How to Dispose of Used Oil

TIVITY

als for the Student:

Realize the problems associated with the preparation of usable water.

Recognize the impact of water pollution.

Understand the broad problems of water management.

)bjectives for the Student:

Examine some specific contaminants of water.

Examine some techniques required to remove these contaminants.

Establish water as a finite resource.

L THEME:
ess of Resources, Ecological Trade-offs

LS:
ing

NG SKILLS:
Conclusions

LICATION:
)ispose of Used Oil

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE C.	PREPARATION OF USABLE WATER
ACTIVITY 5-14.	OIL IN WATER

MATERIALS

*Jar 4 from Activity 5-12
*Water treatment plant model from Activity 5-9
*Newspaper or magazine clippings on oil spills and their effects on living things

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-14. Oil in Water

Oil pollution has become a major problem. Students geographically removed from oil spills often do not appreciate the impact of oil on the environment. Many persons who change oil in automobiles dispose of their oil through the sewage system. The purpose of this activity is to develop an awareness of the impact of oil on the water supply as inferred from their water treatment plant model.

Review by asking:

> WHAT HAVE WE BEEN TALKING ABOUT IN OUR LAST ACTIVITIES?

> LET'S LOOK AT ANOTHER JAR OF WATER FROM ONE OF OUR EARLIER ACTIVITIES.

Place Jar 4 from Activity 5-12 on the table.

Ask students to identify the contents of the jar.

> HOW COULD WE REMOVE THIS OIL IF IT WERE IN OUR WATER SUPPLY?

Ask:

> COULD YOU BURN OIL ON A LAKE OR RIVER? WHY?

> HOW COULD YOU DIP THE OIL OFF A LAKE OR RIVER?

> COULD YOU RUN IT THROUGH A WATER TREATMENT PLANT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
Oil in Water	*During this activity, each student should:*
as become a major problem. Students *removed from oil spills often do not* *impact of oil on the environment. Many* *nge oil in automobiles dispose of their* *sewage system. The purpose of this* *develop an awareness of the impact of oil* *pply as inferred from their water* *model.*	*--observe the water in Jar 4 and identify it as oil and water.* *--speculate on the various ways oil in water can be cleaned up.* *--observe the effects of oil in the water treatment plant.* *--conclude that oil in the community water treatment plant would be a disaster.* *--discuss several ways oil gets into water.* *--conclude that oil should be reused.*
g:	Students should:
WE BEEN TALKING ABOUT IN OUR LAST ?	--recall Activities 5-12 and 5-13 and respond, "Microbes in water," "Dirty water," "Detergents."
AT ANOTHER JAR OF WATER FROM ONE LIER ACTIVITIES.	
n Activity 5-12 on the table.	
identify the contents of the jar.	--identify the contents of Jar 4 as oil and water.
WE REMOVE THIS OIL IF IT WERE IN SUPPLY?	--speculate on ways of removing the oil, such as burning it, absorbing it with something, dipping it off, running it through the treatment plant.
BURN OIL ON A LAKE OR RIVER? WHY?	--respond, "No, it would burn trees and stuff along the shore."
YOU DIP THE OIL OFF A LAKE OR RIVER?	--respond, "Don't think you could," "It is too hard to dip it off the surface."
RUN IT THROUGH A WATER TREATMENT PLANT?	--respond, "Yes," but may express concern for the plant.

MATERIALS	TEACHING STRATEGIES

LET'S RUN WATER FROM JAR 4 THROUGH OUR WATER TREATMENT PLANT AND SEE WHAT HAPPENS.

WHAT DO YOU THINK WILL HAPPEN?

Run the oil through the model. Be sure to continue running the water through the model until much of the oil has gone through the filter to the bed of sand.

Ask:

DID THE MODEL TAKE THE OIL OUT OF THE WATER?

DID THE OIL CREATE ANY PROBLEMS? WHAT WERE THEY?

Discuss the mess and how to clean up the model.

WHAT WOULD OIL DO TO OUR CITY WATER TREATMENT PLANT?

HOW WOULD OIL LIKE THIS GET INTO OUR WATER SUPPLY IN THE FIRST PLACE?

At this time display and discuss the newspaper or magazine clippings you have gathered on oil spills, how they have been cleaned up, how they have affected wildlife, and so forth.

WHAT CAN WE DO TO PREVENT THIS OIL FROM ENTERING OUR WATER SUPPLY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
TER FROM JAR 4 THROUGH OUR WATER ANT AND SEE WHAT HAPPENS.	
THINK WILL HAPPEN?	--speculate on what might happen when the oil is run through the water treatment plant.
gh the model. Be sure to continue through the model until much of the ugh the filter to the bed of sand.	
L TAKE THE OIL OUT OF THE WATER?	--respond, "Yes."
CREATE ANY PROBLEMS? WHAT WERE	--respond, "Yes, made a complete mess of the model."
and how to clean up the model.	--conclude it might be best to throw out the sand and wash everything with soap and water or throw the model away.
IL DO TO OUR CITY WATER TREATMENT	--infer that oil in the city water treatment plant supply would be a disaster.
L LIKE THIS GET INTO OUR WATER E FIRST PLACE?	--respond, "From cars," "From any motor," "Tanker leaks."
lay and discuss the newspaper or magazine e gathered on oil spills, how they have how they have affected wildlife, and so	
DO TO PREVENT THIS OIL FROM ENTERING PPLY?	--suggest care in disposing used motor oil, checking oil tankers for leaks, and so forth.

ACTIVITY
5-14

MATERIALS

TEACHING STRATEGIES

CAN USED OIL BE RECYCLED?

Students may wish to phone or visit a garage or gas station to find out where their used oil goes. Used oil is sometimes cleaned and used again.

WHAT IS DONE WITH THE OLD OIL WHEN THE OIL IN YOUR FAMILY CAR IS CHANGED?

WHAT COULD WE USE OLD OIL FOR?

See Change of Pacers 16 and 17.

TEACHING STRATEGIES

OIL BE RECYCLED?

ish to phone or visit a garage or gas
d out where their used oil goes. Used
es cleaned and used again.

ONE WITH THE OLD OIL WHEN THE OIL IN
LY CAR IS CHANGED?

D WE USE OLD OIL FOR?

acers 16 and 17.

CHANGE OF PACER

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "Yes," "No," "I don't know."

--tell what is done with oil from an oil change.

--suggest such things as "Oil roads," "Clean it up and use it again."

Upon completion of this activity, __each student__ should, as a minimum:

--be able to state in some way that oil in a community treatment plant would be a disaster and must be avoided.

--suggest an alternative to disposing of oil in water.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
OIL BE RECYCLED?	--respond, "Yes," "No," "I don't know."
ish to phone or visit a garage or gas d out where their used oil goes. Used es cleaned and used again.	
ONE WITH THE OLD OIL WHEN THE OIL IN LY CAR IS CHANGED?	--tell what is done with oil from an oil change.
D WE USE OLD OIL FOR?	--suggest such things as "Oil roads," "Clean it up and use it again."
	Upon completion of this activity, each student should, as a minimum:
	--be able to state in some way that oil in a community treatment plant would be a disaster and must be avoided. *--suggest an alternative to disposing of oil in water.*
acers 16 and 17.	

CHANGE OF PACER

UNIT V, CORE C
ACTIVITY 5-14

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Do you feel that the students realized the great effect oil could have on a water treatment plant following the experiment? ☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Do you feel that the students realized the great effect oil could have on a water treatment plant following the experiment? ☐ Yes ☐ No

13. What suggestions did students make for alternative methods of oil disposal?

UNIT V, CORE C
ACTIVITY 5-14

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Recognize the sources of water.

6. Understand the broad problems of water management.

Core C Objectives for the Student:

1. Examine some specific contaminants of water.

2. Examine some techniques required to remove these contaminants.

4. Establish water as a finite resource.

ENVIRONMENTAL THEME:
Finiteness of Resources

INQUIRY SKILLS:
Inferring

PROBLEM-SOLVING SKILLS:
Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:
How to Prepare Salt Water for Drinking,
Discussing in a Group

TIVITY

als for the Student:
Recognize the sources of water.

Understand the broad problems of water management.

Objectives for the Student:
Examine some specific contaminants of water.

Examine some techniques required to remove these contaminants.

Establish water as a finite resource.

L THEME:
ess of Resources

LS:
ng

ING SKILLS:
ing, Defending, Answering Why Questions

PLICATION:
Prepare Salt Water for Drinking,
ing in a Group

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE C. PREPARATION OF USABLE WATER

ACTIVITY 5-15. DISTILLATION OF WATER

ACTIVITY
5-15

MATERIALS

- 1 Flask, 250 ml
- 1 Rubber stopper, 1-holed, #6
- 1 Bent glass tube
- 6 Test tubes
- 1 Beaker, 1000 ml, with ice
- Test tube clamp
- Vinyl tubing, 1/4-inch diameter
- *Water treatment model, from Activity 5-9
- *Jars 3 and 5 from Activity 5-12
- *Hot plates
- *Water

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-15. Distillation of Water

This activity will show another method of removing dissolved and solid substances from water. Though seld presently used in water treatment plants, the process o distillation has application for desalinization of salt water. The process of evaporation and condensation wil be elaborated on in a later activity on the water cycle.

Begin by asking:

IF WE HAVE SOME WATER WE KNOW IS DIRTY AND PROBABLY HAS MICROBES LIVING IN IT, HOW CAN WE KILL THOSE MICROBES?

CAN YOU GET OTHER THINGS LIKE MUD AND SALT OUT OF WATER BY BOILING IT?

HOW COULD YOU GET THE MUD AND SALT OUT OF THE WATER?

WHAT HAPPENS TO THE WATER WHEN YOU BOIL IT?

WOULD MUD AND SALT BE IN THE STEAM, TOO?

WHERE DOES STEAM GO?

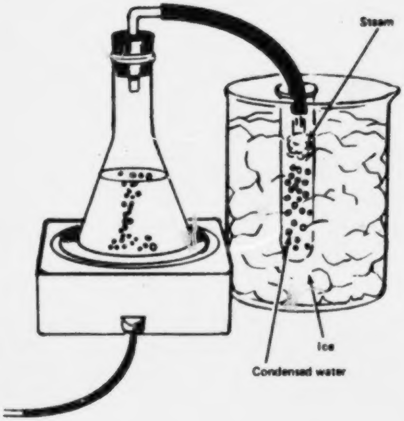
HOW COULD YOU GET THIS STEAM WATER BACK?

IN TODAY'S ACTIVITY WE WILL CATCH THE STEAM WATER THAT COMES FROM BOILING WATER. THEN WE WILL FIND OUT IF THE MUD AND SALT ARE STILL IN THE WATER.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
Distillation of Water *ill show another method of removing solid substances from water. Though seldom in water treatment plants, the process of as application for desalinization of salt ocess of evaporation and condensation will on in a later activity on the water cycle.*	*During this activity, each student should:* *--observe the distillation of water.* *--conclude that distillation removes solids and dissolved minerals from water.* *--conclude that distilled water would be safe to drink.* *--predict that under the normal processes used in water treatment plants, salt would not be taken out of water.* *--speculate that distillation could be used on ocean vessels, in coastal cities, or in emergencies to prepare drinking water.*
:	Students should:
SOME WATER WE KNOW IS DIRTY AND AS MICROBES LIVING IN IT, HOW CAN OSE MICROBES?	--recall the boiling process used in Activity 5-12.
T OTHER THINGS LIKE MUD AND SALT OUT Y BOILING IT?	--respond, "No, only microbes."
YOU GET THE MUD AND SALT OUT OF THE	--suggest ways to get mud and salt out of water or respond, "I don't know."
NS TO THE WATER WHEN YOU BOIL IT?	--respond, "It gets hot," "Bubbles," "Steams."
AND SALT BE IN THE STEAM, TOO?	--respond, "Yes," "No," "Maybe," "I don't know."
STEAM GO?	--respond, "Into the air."
YOU GET THIS STEAM WATER BACK?	--respond, "I don't know," "With a glass."
ACTIVITY WE WILL CATCH THE STEAM COMES FROM BOILING WATER. THEN WE OUT IF THE MUD AND SALT ARE STILL IN	

MATERIALS

Diagram 5-6



TEACHING STRATEGIES

DO YOU THINK THE MUD AND SALT WILL STILL BE IN THE WATER AFTER WE CATCH THE STEAM?

Set up the apparatus as shown in Diagram 5-6. Use the muddy water and salt water samples from Activity 5-12 (Jars 3 and 5). First boil the salt water and then the muddy water. Collect a number of test tube samples of each kind of water. As the distillation is in process, ask one or more of the students to describe what is happening.

Display the samples of the condensed water collected and ask:

DO THESE WATER SAMPLES HAVE LIVING MICROBES IN THEM?

HOW DO YOU KNOW?

DID THE MUD COME THROUGH THE TUBE?

DID THE SALT COME THROUGH THE TUBE?

HOW COULD WE FIND OUT?

WOULD THIS BOILED SALT WATER BE SAFE TO DRINK? WHY?

Ask some volunteers to drink the water samples.

Ask:

CAN YOU TASTE ANY SALT IN THE WATER?

DO YOU THINK THIS WATER IS NOW SAFE ENOUGH TO DRINK? WHY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
THE MUD AND SALT WILL STILL BE AFTER WE CATCH THE STEAM?	--guess, "Yes," "No."
tus as shown in Diagram 5-6. Use the alt water samples from Activity 5-12 First boil the salt water and then the lect a number of test tube samples of r. As the distillation is in process, f the students to describe what is	
es of the condensed water collected and	
ER SAMPLES HAVE LIVING MICROBES IN	--respond, "No."
NOW?	--recall that boiling kills microbes.
COME THROUGH THE TUBE?	--recall the observation and respond, "No."
COME THROUGH THE TUBE?	--conclude that you cannot tell by looking at the sample.
FIND OUT?	--infer that tasting would be a good test for salt.
OILED SALT WATER BE SAFE TO DRINK?	--state, "Yes, the boiling kills the microbes."
rs to drink the water samples.	
E ANY SALT IN THE WATER?	--respond, "No."
THIS WATER IS NOW SAFE ENOUGH TO	--respond, "Yes," and give such reasons as "It's clear," "Boiling killed the microbes," "Yes, but it tastes funny."

MATERIALS

TEACHING STRATEGIES

If the students raise the question of a strange taste in the water you may want to stopper the tubes and shake them to mix the air with the water in order to improve the flavor. You may also wish to discuss with the students the source of the funny taste (the rubber stopper, no air could get in, and so forth).

WHERE DOES THE WATER WE DRINK COME FROM?

COULD PEOPLE WHO LIVE NEAR THE OCEAN USE THAT WATER FOR DRINKING WATER?

WHAT WOULD OCEAN WATER TASTE LIKE?

WOULD A WATER TREATMENT PLANT LIKE OURS TAKE THE SALT OUT OF THE WATER?

At this time if any students think that the treatment plant will remove the salt, have them put some salty water through the treatment plant, treat it with chlorine, stick their finger in the water, and taste it. It should taste salty.

HOW COULD CITIES WHO NEED TO USE OCEAN WATER REMOVE THE SALT FROM IT?

WHO ELSE MIGHT NEED TO USE THIS METHOD OF CLEANING WATER?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
raise the question of a strange taste in ay want to stopper the tubes and shake air with the water in order to improve u may also wish to discuss with the urce of the funny taste (the rubber could get in, and so forth).	
THE WATER WE DRINK COME FROM?	--respond, "Faucet," "Water tower," "Reservoir," "Treatment plant," and so on.
LE WHO LIVE NEAR THE OCEAN USE THAT DRINKING WATER?	--respond, "Yes," "No," "Maybe."
OCEAN WATER TASTE LIKE?	--respond, "Salty," "Bad."
TER TREATMENT PLANT LIKE OURS TAKE UT OF THE WATER?	--predict that it probably will not.
any students think that the treatment ve the salt, have them put some salty he treatment plant, treat it with their finger in the water, and taste it. salty.	
CITIES WHO NEED TO USE OCEAN WATER SALT FROM IT?	--respond, "Just as we did," "Boil it and catch the steam water."
IGHT NEED TO USE THIS METHOD OF ATER?	--speculate on different circumstances and respond with such instances as, "On a ship," "In the Navy," "In emergencies."
	Upon completion of this activity, each student should, as a minimum:
	--*have observed the distillation of water.* --*be able to describe distillation as a way of removing things from water.*

MATERIALS	TEACHING STRATEGIES
	✓ CHANGE See Change of Pacer 18.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

CHANGE OF PACER

cer 18.

MATERIALS

TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE C
ACTIVITY 5-15

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the distillation experiment work correctly? ☐ Yes ☐ No If not, what problems did you have?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the distillation experiment work correctly? ☐ Yes ☐ No If not, what problems did you have?

13. Do you think that students believed that the mud and salt were being left behind because of distillation or did they look on it as magic?

14. Were the students able to relate the distillation experiment with desalinization on a large scale? Yes No If not, what materials and/or methods could be used to emphasize the relationship?

UNIT V, CORE C
ACTIVITY 5-15

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.

2. Recognize the sources of water.

3. Realize the problems associated with the preparation of usable water.

6. Understand the broad problems of water management.

Core C Objectives for the Student:

2. Examine some techniques required to remove these contaminants.

3. Introduce the concept of the natural water cycle.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Cyclic Nature of Processes

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Interpreting Results

PRACTICAL APPLICATION:

Vocabulary, Discussion Skills

ACTIVITY

oals for the Student:
. Understand the need for water.

. Recognize the sources of water.

. Realize the problems associated with the preparation of usable water.

. Understand the broad problems of water management.

Objectives for the Student:
. Examine some techniques required to remove these contaminants.

. Introduce the concept of the natural water cycle.

AL THEME:
elationships of Environmental Components,
Nature of Processes

LLS:
ng

VING SKILLS:
reting Results

PPLICATION:
lary, Discussion Skills

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE C. PREPARATION OF USABLE WATER

ACTIVITY 5-16. THE WATER CYCLE

MATERIALS

Chart 5-2, *Nature's Water Cycle*
Plastic sweater box
*Globe
*Ice
*Small stones
*Gooseneck lamp, 100 watt
*Plastic sandwich bags
*Magazines, newspapers, catalogs
*Scissors
*Glue or paste
*Large pieces of butcher paper or construction paper
*Water

Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-16. The Water Cycle

We have now investigated the immediate sources of water as well as the problems of supplying drinkable water. Water supply is related to a larger water picture called the water cycle. The total amount of water available is in solid (ice and snow), liquid (lakes, streams, and oceans), and gaseous states (water vapor and clouds), an is really a finite resource. It is important that the students realize that the total supply of water on the earth is not unlimited. In this activity, the students will examine nature's way of preparing water (the water cycle) and assemble a working model of this system in the classroom.

Teacher Preparation:

The water cycle model is designed so that the process of evaporation and condensation of water are confined withi a closed plastic box. Sources of heat (light bulb) and cold (ice cubes) are applied to the outside of the box. The elements of the model are: a plastic box which holds the moisture-laden air, a pool of water (about one cup) representing the earth's oceans, a pile of small stones representing a mountain range, a small lamp representing the sun, and a bag of ice cubes to represent the chillin of the upper atmosphere. As pictured in Diagram 5-7, the model should be assembled on a slant so that the "ocean" is confined to one end (about one-third of the bottom area.) The warm air, heated by the lamp and carrying the moisture from the "ocean," will rise to the upper end of the chamber, where it will be chilled by the ice. As the air is chilled by the ice, the moisture in the air will condense and form droplets on the area of the lid that is underneath the ice. When these droplets fall, it will "rain." The stones for the model should be washed immediately before use. This will saturate the dry surfaces and reduce the length of time it takes for the model to work. The model will operate most effectively i the bag of ice is covered with an inverted dish or beaker This will confine the cold and keep the ice from melting.

TEACHING STRATEGIES

The Water Cycle

vestigated the immediate sources of water problems of supplying drinkable water. related to a larger water picture called . The total amount of water available is nd snow), liquid (lakes, streams, and seous states (water vapor and clouds), and ite resource. It is important that the e that the total supply of water on the limited. In this activity, the students ture's way of preparing water (the water mble a working model of this system in

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model is designed so that the process of condensation of water are confined within c box. Sources of heat (light bulb) and) are applied to the outside of the box. the model are: a plastic box which holds den air, a pool of water (about one cup) e earth's oceans, a pile of small stones mountain range, a small lamp representing bag of ice cubes to represent the chilling mosphere. As pictured in Diagram 5-7, the assembled on a slant so that the "ocean" one end (about one-third of the bottom n air, heated by the lamp and carrying the he "ocean," will rise to the upper end of ere it will be chilled by the ice. As the by the ice, the moisture in the air will rm droplets on the area of the lid that is ice. When these droplets fall, it will ones for the model should be washed ore use. This will saturate the dry duce the length of time it takes for the The model will operate most effectively if is covered with an inverted dish or beaker. e the cold and keep the ice from melting.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--observe the operation of the water cycle model.*
- *--associate the operation of the model with the natural water cycle of the earth.*
- *--describe the water cycle.*
- *--complete a picture chart of the natural water cycle.*

MATERIALS

Diagram 5-7

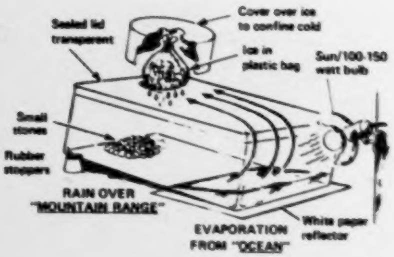
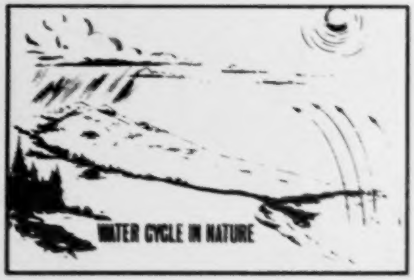

Sealed lid transparent
Cover over ice to confine cold
Ice in plastic bag
Sun/100-150 watt bulb
Small stones
Rubber stoppers
RAIN OVER "MOUNTAIN RANGE"
EVAPORATION FROM "OCEAN"
White paper reflector

Chart 5-2


WATER CYCLE IN NATURE

TEACHING STRATEGIES

A sheet of white paper under the "ocean" and the lamp will reflect heat in that area. Again, this will reduce the time it takes for the model to work.

In review, ask:

> HOW DID WE GET THE SALT OUT OF THE WATER IN OUR LAST EXPERIMENT?
>
> WHAT HAPPENED TO THE WATER WHEN IT WAS BOILED?
>
> HOW DOES WATER GET INTO THE AIR? DO YOU ALWAYS HAVE TO BOIL IT?
>
> HOW DO WE KNOW THAT THERE IS WATER IN THE AIR?

If students do not indicate knowledge that there is water in the air, tell them that clouds are made of water, as is fog.

> WHAT DOES WATER FORM WHEN IT GOES INTO THE AIR?
>
> WHAT COMES FROM CLOUDS?
>
> WHERE DO THE RAIN AND SNOW GO?

Display Chart 5-2, *The Natural Water Cycle*, and continue the discussion, reinforcing the conclusions and inferences already established (i.e., water from lakes, oceans, and rivers goes into the air; forms clouds; comes out of the clouds as rain; and goes back into the bodies of water). Then display the components of the water cycle model.

Say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
paper under the "ocean" and the lamp t in that area. Again, this will reduce s for the model to work.	
GET THE SALT OUT OF THE WATER IN PERIMENT?	--recall and state, "Water was boiled and caught again."
ED TO THE WATER WHEN IT WAS BOILED?	--indicate it went up in steam, went into the air.
TER GET INTO THE AIR? DO YOU TO BOIL IT?	--respond, "No," "Rain is in the air," "I don't know."
NOW THAT THERE IS WATER IN THE AIR?	--indicate, "Clouds," "Fog," "You can see it," as evidence of water in the air.
ot indicate knowledge that there is water them that clouds are made of water, as is	
ATER FORM WHEN IT GOES INTO THE AIR?	--state, "Clouds."
FROM CLOUDS?	--state, "Rain," "Snow," "Hail," "Sleet," etc.
RAIN AND SNOW GO?	--indicate some places that precipitation goes, such as, "Rivers," "Oceans," "The ground."
2, *The Natural Water Cycle*, and continue reinforcing the conclusions and dy established (i.e., water from lakes, rs goes into the air; forms clouds; comes as rain; and goes back into the bodies display the components of the water	

ACTIVITY
5-16

MATERIALS

TEACHING STRATEGIES

WE SHOULD NOW BE ABLE TO PUT TOGETHER A MODEL OF THE NATURAL WATER CYCLE.

Have the students assist you in assembling the model according to Diagram 5-7. Pour water into the model and replace the cover.

Then say:

WHEN THE WATER GOES FROM THE OCEAN INTO THE AIR, DOES IT TAKE ANY DIRT WITH IT?

WE'VE TALKED ABOUT THE WAYS PEOPLE CLEAN UP THE WATER. THE WATER CYCLE IS NATURE'S WAY OF CLEANING THE WATER.

Set the assembled model aside until the next day.

The next day, begin by saying?

TODAY WE WILL USE OUR MODEL TO SHOW HOW THE NATURAL WATER CYCLE WORKS.

Have the students turn on the light and place a sandwich bag of ice cubes (about six) in the cover trough.

TEACHING STRATEGIES

NOW BE ABLE TO PUT TOGETHER A MODEL
TURAL WATER CYCLE.

ts assist you in assembling the model
agram 5-7. Pour water into the model and
er.

ATER GOES FROM THE OCEAN INTO THE AIR,
KE ANY DIRT WITH IT?

ED ABOUT THE WAYS PEOPLE CLEAN UP THE
E WATER CYCLE IS NATURE'S WAY OF
HE WATER.

ed model aside until the next day.

egin by saying?

ILL USE OUR MODEL TO SHOW HOW THE
TER CYCLE WORKS.

ts turn on the light and place a sandwich
s (about six) in the cover trough.

WAITING TIME

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recall the distillation process in Activity 5-15 and respond, "No, that stays behind."

MATERIALS	TEACHING STRATEGIES
	Direct attention to the chart, *The Natural Water Cycle*, and review yesterday's discussion on it. When the condensate begins to drip (rain) from the area of the ice trough, ask: WHAT DO YOU SEE HAPPENING? WHAT HAPPENED TO THE WATER WE PUT INTO THE MODEL? WHAT HAPPENED TO THE WATER THAT WENT INTO THE AIR? WHAT DID THE ICE DO TO THE WATER THAT WENT INTO THE AIR? WHAT HAPPENED TO THE WATER IN THE AIR AFTER IT COOLED? WHERE DID THE DROPS OF WATER (rain) GO? WHERE WOULD THE RAIN GO AFTER IT FELL ON THE ROCKS? Have students relate the parts of the model to their surroundings by asking: HOW DID THE WATER IN OUR MODEL GET HEATED? WHAT HEATS OUR WATER IN THE OCEANS AND LAKES? WHAT DID OUR LAMP REPRESENT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
n to the chart, *The Natural Water Cycle*, erday's discussion on it.	--should recall the essentials of the water cycle.
ate begins to drip (rain) from the area gh, ask:	
SEE HAPPENING?	--state their observations, any number of related responses, such as, "It's dripping," "It's raining."
ED TO THE WATER WE PUT INTO THE MODEL?	--state, "Got hot," "Gave off steam," "Went into the air."
ED TO THE WATER THAT WENT INTO THE	--indicate it rose to the top of the model.
E ICE DO TO THE WATER THAT WENT R?	--state, "Cooled it."
ED TO THE WATER IN THE AIR AFTER IT	--conclude that the water in the air cooled and formed drops of water or rain.
HE DROPS OF WATER (rain) GO?	--state, "Returned to the rocks."
THE RAIN GO AFTER IT FELL ON THE	--infer that because the area is tipped, the water would roll down into the lower end.
late the parts of the model to their asking:	
WATER IN OUR MODEL GET HEATED?	--state, "The lamp."
OUR WATER IN THE OCEANS AND LAKES?	--indicate that the sun heats our water.
R LAMP REPRESENT?	--indicate that the lamp represented the sun.

MATERIALS

TEACHING STRATEGIES

WHERE DID THE WATER IN THE MODEL GO?

WAS IT COLD AT THE TOP OF THE MODEL?

DOES THE AIR GET COLDER HIGHER IN THE SKY THAN CLOSER TO THE GROUND?

WHAT DID THE TOP OF OUR MODEL WITH THE ICE ON IT REPRESENT?

The idea of a decrease in temperature as altitude is increased can be developed by discussing how it snows in the mountains while it rains below, or how airplanes need to be heated or pilots need to wear warm clothing.

WHAT HAPPENS TO THE WATER IN THE OCEAN?

WHERE DOES IT RISE TO?

WHAT HAPPENED TO THE WATER IN THE AIR WHEN IT TOUCHED OR REACHED THE COLD TOP WITH THE ICE ON IT?

WHAT HAPPENS TO THE OCEAN WATER WHEN IT EVAPORATES INTO THE AIR AND RISES TO THE COLDER AIR FOUND HIGHER IN THE SKY?

Print each of the following words on a three-by-five-inch index card: evaporation, condensation, and precipitation.

Say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HE WATER IN THE MODEL GO?	--respond, "To the air," "To the top of the model."
AT THE TOP OF THE MODEL?	--recall the location of the ice and state, "Yes."
R GET COLDER HIGHER IN THE SKY THAN HE GROUND?	--indicate that the air gets colder higher in the sky.
E TOP OF OUR MODEL WITH THE ICE ON IT	--infer that it represented the sky, or the atmosphere.
crease in temperature as altitude is developed by discussing how it snows while it rains below, or how airplanes d or pilots need to wear warm clothing.	
S TO THE WATER IN THE OCEAN?	--indicate that it rises into the air.
IT RISE TO?	--state, "Into the air," "Into the clouds."
ED TO THE WATER IN THE AIR WHEN IT REACHED THE COLD TOP WITH THE ICE	--state, "It turned back to water," "It rained."
S TO THE OCEAN WATER WHEN IT EVAPORATES R AND RISES TO THE COLDER AIR FOUND HE SKY?	--infer that it must turn into water, clouds, or rain.
e following words on a three-by-five- evaporation, condensation, and	

MATERIALS	TEACHING STRATEGIES

WHAT WE HAVE JUST OBSERVED AND DESCRIBED IS CALLED OUR WATER CYCLE. (Point to the chart and to the word on the chalkboard.) A WATER CYCLE IS THE CIRCLE OUR WATER MAKES.

OUR WATER EVAPORATES, WHICH MEANS IT GOES INTO THE AIR. (Point to the chart.)

Tape the evaporation card on the chart next to the arrows. Do this by putting tape on the back of the card so it sticks to the chart.

THE WATER RISES TO THE COLDER UPPER AIR WHERE IT CONDENSES. (Point to the word.)

Tape the condensation card on the chart next to the clouds.

CONDENSES MEANS THE WATER IN THE AIR BEGINS TO FORM DROPS OF REAL WATER AGAIN. (Point to the chart.)

THOSE DROPS FORM CLOUDS AND PRECIPITATION. (Point to the word.) PRECIPITATION MEANS RAIN OR SNOW.

Tape the precipitation card on the chart next to the rain drops.

THE RAIN OR SNOW FALLS BACK TO THE EARTH AND RUNS INTO OUR RIVERS, OCEANS, PONDS, AND LAKES. (Point to the chart.)

WHERE DOES THE WATER GO AFTER IT REACHES THE RIVERS, OCEANS, AND PONDS?

Emphasize, by using the water cycle chart, the cyclic nature of the water.

TEACHING STRATEGIES

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WATER CYCLE. (Point to the chart and to
the chalkboard.) A WATER CYCLE IS
OUR WATER MAKES.

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S. (Point to the word.)

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S OF REAL WATER AGAIN. (Point
.)

FORM CLOUDS AND PRECIPITATION.
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.

ation card on the chart next to the

SNOW FALLS BACK TO THE EARTH AND RUNS
ERS, OCEANS, PONDS, AND LAKES.
e chart.)

HE WATER GO AFTER IT REACHES THE
NS, AND PONDS?

ng the water cycle chart, the cyclic
er.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "Back into the air," "Into the sky."

ACTIVITY
5-16

MATERIALS

TEACHING STRATEGIES

Remove the three identification cards from the chart an have several students try to describe the water cycle. As they describe the cycle, have them tape the identification cards in the proper places.

Clues to Success:

Have a large selection of magazines, newspapers, catalo scissors, and paste or tape available. Distribute one large piece of butcher paper or construction paper to each student.

Say:

> WE HAVE MADE A MODEL OF THE NATURAL WATER CYCLE IN OUR ROOM. THE NEXT THING WE ARE GOING TO DO IS MAKE A PICTURE CHART OF THE NATURAL WATER CYCLE. TRY TO FIND PICTURES THAT REMIND YOU OF EACH PART OF THE WATER CYCLE: EVAPORATION, OR THE WATER GOING INTO THE AIR, CONDENSATION, OR THE WATER IN THE AIR BEGINNING TO FORM BACK INTO DROPS, AND PRECIPITATION, OR THE WATER COMING BACK TO THE EARTH. (Point to these parts of the water cycle on Chart 5-2 as you explain.)
>
> IF YOU WOULD RATHER DRAW A PICTURE THAT SHOWS THESE PARTS OF THE WATER CYCLE, YOU MAY.
>
> THESE THINGS HAPPEN IN A CERTAIN ORDER, SO WHEN YOU FIND PICTURES THAT REMIND YOU OF THE PARTS OF THE WATER CYCLE, BE SURE YOU PASTE THEM ON YOUR PAPER IN THE RIGHT ORDER.
>
> WHEN YOUR WATER CYCLE PICTURES ARE PASTED ON THE PAPER, DRAW ARROWS ON THE PAPER TO SHOW THAT THE NATURAL WATER CYCLE IS A CYCLE, OR A CIRCLE.

TEACHING STRATEGIES

identification cards from the chart and
dents try to describe the water cycle.
the cycle, have them tape the identi-
n the proper places.

:

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utcher paper or construction paper to

E A MODEL OF THE NATURAL WATER CYCLE
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ATER CYCLE PICTURES ARE PASTED ON THE
ARROWS ON THE PAPER TO SHOW THAT THE
ER CYCLE IS A CYCLE, OR A CIRCLE.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--describe the water cycle.

MATERIALS

TEACHING STRATEGIES

As a reminder to the students of what they are to do, write, "evaporation," "condensation," "precipitation," and "cycle" on the chalkboard. Also display Chart 5-2 and tell the students that if they have difficulty, looking at the chart might give them a hint.

Circulate among the students as they are working, encouraging them, but not giving specific suggestions.

If the student has a good understanding of the natural water cycle, his picture chart should include one of the types of pictures suggested as representing a part of the water cycle.

1. Evaporation: a lake, river, ocean, pool, pond, waterfall, dam, reservoir, wet clothes, barrel of water, stream, or any other picture showing a body or collection of water.
2. Condensation: a cloud, fog, drops on the outside of a cold glass.
3. Precipitation: rain, snow falling, snow on the ground, sleet, hail, thunder, lightning, puddles of rain water, or any other picture suggesting precipitation.
4. Cycle: arrows should be drawn connecting all parts of the cycle. An arrow should be shown going from evaporation to condensation, from condensation to precipitation, and from precipitation back to evaporation. If a picture of land or people was included, the arrow from precipitation should go to the land or people, and then to evaporation.

The criteria for rating the picture charts appear on Tallysheet 5-4. Make a copy of the completed Tallysheet

TEACHING STRATEGIES

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rating the picture charts appear on Make a copy of the completed Tallysheet

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

and send it to BSCS. Also record the results on the Concepts page of the Student Record of Progress. If by looking at the students' posters you see that the majori of them have not grasped the concept of the natural wate cycle, further instruction using Part I of this Activity is appropriate.

TEACHING STRATEGIES

BSCS. Also record the results on the of the Student Record of Progress. If by students' posters you see that the majority ot grasped the concept of the natural water instruction using Part I of this Activity .

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have observed the operation of the water cycle model.*
- *--have associated the operation of the model with the natural water cycle.*
- *--have attempted to complete the picture chart of the natural water cycle.*

UNIT V, CORE C
ACTIVITY 5-16

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the model of the water cycle work well? ☐ Yes ☐ No If not, what problems did you have with it?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the model of the water cycle work well? ☐ Yes ☐ No If not, what problems did you have with it?

13. Was the water cycle chart with its component cards helpful in the discussion of the water cycle? ☐ Yes ☐ No

14. Select two or three student water cycle posters and send them to BSCS.

15. Complete and send Tallysheet 5-4 to BSCS.

UNIT V, CORE C
ACTIVITY 5-16

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

UNIT V
REACTIONS TO CORE C

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core? ☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

Side A

NEW STUDENTS ENTERING DURING THIS CO

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Tes
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-American
O = other

W=WIS
B=Bin
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

p	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				

W=WISC
B=Binet
O=Other
(Name)

for Dropping

Me and my·
Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE D. WATER MANAGEMENT

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

The two parts of this unit w
air and water as major components
Part 1 emphasizes the import
environment by helping the studen

1. Understand the need for wate
2. Recognize the sources of wat
3. Realize the problems associa
4. Realize the problems associa
5. Recognize the impact of wate
6. Understand the broad problem

Part 2 emphasizes the nature
by helping the student to:

7. Understand the composition o
8. Realize that the quality of
9. Realize that substances are
10. Comprehend the impact of air

C

1. Establish that water is a li
2. Establish that water is a vu
3. Establish that, as populatio
4. Establish that, as populatio

IT V. AIR AND WATER IN MY ENVIRONMENT

RE D. WATER MANAGEMENT

BSCS

UNIT V GOALS

The two parts of this unit will serve to develop an appreciation of the roles of air and water as major components of our environment.

Part 1 emphasizes the importance of water as a vulnerable component of our environment by helping the student to:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Part 2 emphasizes the nature of air as a complex component of our environment by helping the student to:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

CORE D OBJECTIVES

1. Establish that water is a limited resource.
2. Establish that water is a vulnerable resource.
3. Establish that, as population increases, demands upon resources increase.
4. Establish that, as population increases, impact on environment increases.

CORE D RATIONALE

Previous cores in this unit have emphasized uses, sources, and preparation of usable water. The impact of man's activities on water quality, while always implicit, was subordinant to a process or condition. This core deals directly with the consequences of human action. In this sequence of activities, the students will examine some environmental situations in which human decisions have far-reaching effects. The underlying theme, from the point of view of water quality, is: more people, more problems, more need for careful management.

BACKGR

The story, *Fate*
information. At one
as sewage is eventual
ment. While this sub
of the students, a br
below. This is for y
be taught.

Sewage disposal
roughly similar to th
That is, raw sewage,
chemical reaction, fl
the gross process dif
chemical reactions of
these may be extended
than initial floccula
collected by sediment
oxidized by microbial
liquid effluent is th
a stream.

Activity 5-18, S
the issue of streamfl
student is why the sa
them stay downstream,
return to their place
salmon are anadromous
freshwater to spawn.
They not only return
stream. This must be
basis of this homing
is beyond the scope o

sources, and
ities on water
ocess or
ces of human
ill examine some
far-reaching
of water
careful

BACKGROUND INFORMATION FOR THE TEACHER

The story, *Fate of the River*, in itself requires no detailed background information. At one point in the booklet, mention is made that waste water as sewage is eventually returned to the environment after appropriate treatment. While this subject is unlikely to provoke much interest on the part of the students, a brief outline of common disposal practices is presented below. This is for your background only and not provided as information to be taught.

Sewage disposal practices in most communities follow a sequence of events roughly similar to the water treatment process examined in Core B of this unit. That is, raw sewage, after mechanical screening, is subjected to processes of chemical reaction, flocculation, filtration, and sterilization. Naturally the gross process differs in detail. Unlike drinking water treatment, the major chemical reactions of sewage plants involve the action of microbes. Locally these may be extended aeration, activated sludge, or controlled digestion rather than initial flocculation with chemicals. The digestion products are then collected by sedimentation and removed. The remaining liquid is further oxidized by microbial action in lagoons or trickling filters. The final liquid effluent is then sterilized (usually with chlorine) before release to a stream.

Activity 5-18, Save the Salmon, is also a straightforward story involving the issue of streamflow regulation. One point that may be obscure to the student is why the salmon should be aided in swimming upstream. Why not let them stay downstream, or back in the ocean? The answer is that salmon must return to their place of origin in order to reproduce (spawn). Technically salmon are anadromous fish. That is, they live in the sea but return to freshwater to spawn. In practice, this involves a series of complex responses. They not only return to a freshwater stream at spawning time, but to a specific stream. This must be the stream in which they were hatched from the egg. The basis of this homing behavior is not known at this time, and in any event it is beyond the scope of this activity. It is known, however, that the fish

BACKGROUND INF

not only must return to
environment for satisfa
oxygenated gravel beds,
headwaters of the strea
not spawn. Obviously,
will decline. No matte
adult salmon, populatio

Activity 5-20, A L

1. It clearly demonstr
such as air, water,

2. It suggests that po
simply out of place

3. It establishes that
great deal of troub

Previous activitie
this activity, a "make
suitable for goldfish.
oxygen in the water. T

In the class model
dry pet food. Introduc
environment results in
oxygen. Most pollutant
or important materials.
are useful materials.
are now out of place.
in short periods of tim
pollutant may have a gr

BACKGROUND INFORMATION FOR THE TEACHER (continued)

not only must return to their birthplace but also much have a certain environment for satisfactory reproduction. They must find shallow, well-oxygenated gravel beds, for instance, usually at some point well up in the headwaters of the stream. If these conditions are not met, the salmon will not spawn. Obviously, if reproduction is limited, future adult populations will decline. No matter how favorable conditions may be in the ocean for adult salmon, populations are doomed if deprived of suitable spawning sites.

Activity 5-20, A Little Goes a Long Way, serves three functions:

1. It clearly demonstrates the interrelationships of environmental components such as air, water, fish, and microbes.

2. It suggests that pollution may be caused by very common things that are simply out of place.

3. It establishes that sometimes a very small amount of pollutant can cause a great deal of trouble.

Previous activities have established that living things need oxygen. In this activity, a "make believe sewage" mixture is introduced to water normally suitable for goldfish. Subsequent microbial action uses up the available oxygen in the water. The fish responds by exhibiting symptoms of stress.

In the class model, the "sewage" material is prepared by emulsifying some dry pet food. Introduction of this otherwise useful material to the fish's environment results in obvious pollution, with associated depletion of oxygen. Most pollutants that students will encounter are otherwise useful or important materials. Oil, phosphates, metals, acids, even sewage solids, are useful materials. Trouble occurs when they are not handled properly. They are now out of place. The environment may not be able to cope with this change in short periods of time. In such a situation, a very small amount of pollutant may have a great deal of impact.

BSCS

Me and my·
Environment

UNIT V
CORE D

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in*
be prepared several days or weeks in advance. Use
a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italic*
5-17. Fate of the River Days needed: 2	Tape recorder	Booklet, *Fate of the River*	One per st
5-18. Save the Salmon Days needed: 2	35 mm Slide projector A variety of art supplies and magazines Paper to make a mural	Slide 5-18 Slide 5-19 Slide 5-20 Slide 5-21 Slide 5-22 Slide 5-23 Slide 5-24 Slide 5-25 Slide 5-26 Slide 5-27 Slide 5-28	Newspaper h Newspaper h Newspaper h Newspaper h Picture of Aerial view Salmon swim Graph of wa Newspaper h Newspaper h Salmon swim
5-19. Population Versus Water Supply Days needed: 3+	35 mm Slide projector 1/2" - 1" Grid graph paper Local data for the years 1900-1970 on: Rainfall amounts Population increase Water use increase		Three sheet Consult you Consult com Consult com

PLANNING GUIDE

ities (*indicated in italics and an* ↙ *in the margin*) must
d several days or weeks in advance. Use this summary as
and preparation schedule. All supplies needed are listed.

BSCS

upplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
Booklet, *Fate of the River*	One per student
Slide 5-18	Newspaper headline
Slide 5-19	Newspaper headline
Slide 5-20	Newspaper headline
Slide 5-21	Newspaper headline
Slide 5-22	Picture of Gold Stream
Slide 5-23	Aerial view of Victoria, B. C.
Slide 5-24	Salmon swimming upstream
Slide 5-25	Graph of water use
Slide 5-26	Newspaper headline
Slide 5-27	Newspaper headline
Slide 5-28	Salmon swimming upstream
	Three sheets per student
	Consult your nearest weather service Consult community government or census figures Consult community water treatment plant

Me and my· Environment

UNIT V
CORE D

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛
be prepared several days or weeks in advance. U
a teaching and preparation schedule. All suppli

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ita*
5-19. Population Versus Water Supply (continued)		Worksheet 5-8	Rainfal
		Worksheet 5-9	Populati
		Worksheet 5-10	Water us
		Slide 5-29	Boulder,
		Slide 5-30	Complete
		Slide 5-31	Boulder,
		Slide 5-32	Complete
		Slide 5-33	Boulder,
		Slide 5-34	Complete
5-20. A Little Goes a Long Way	One gallon, wide-mouthed jars		Two
	Goldfish		Two
Days needed: 2	Aquarium water		*Two gall* *if it* *from t* *to sta* *(added* *vapor.*
	Dry pet food		Dog, ham
	Small aquarium net		To catch
		400 ml Cup or beaker	
		Tablespoon	
		Microscopes	Four
		Microscope slides	Four
		Medicine droppers	Four

PLANNING GUIDE

BSCS

ctivities (*indicated in italics and an* ➤ *in the margin*) must
pared several days or weeks in advance. Use this summary as
ning and preparation schedule. All supplies needed are listed.

f Supplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
Worksheet 5-8	Rainfall graph - one worksheet per student
Worksheet 5-9	Population graph - one worksheet per student
Worksheet 5-10	Water use graph - one worksheet per student
Slide 5-29	Boulder, Colorado rainfall figures
Slide 5-30	Completed Worksheet 5-8
Slide 5-31	Boulder, Colorado population figures
Slide 5-32	Completed Worksheet 5-9
Slide 5-33	Boulder, Colorado water use
Slide 5-34	Completed Worksheet 5-10
	Two
	Two
	Two gallons. Tap water may be substituted for aquarium water if it is suitably conditioned. Water should be run forcibly from the tap into a large open container (basin) and allowed to stand for three or four days. This will allow the chlorine (added at the treatment plant) to dissipate into the air as vapor.
	Dog, hamster, gerbil, cat
	To catch fish
400 ml Cup or beaker	
Tablespoon	
Microscopes	Four
Microscope slides	Four
Medicine droppers	Four

Me and my· Environment

UNIT V
CORE D

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in* be prepared several days or weeks in advance. Use a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italic*
5-21. Clues to Success: Understanding Days needed: 1	35 mm Slide projector	Worksheets 5-11A, B, C, D Slide 5-35 Slide 5-36 Slide 5-37 Slide 5-38 Tallysheet 5-5	Review Que Of review Of review Of review Of review

PLANNING GUIDE

ivities (*indicated in italics and an* ➤ *in the margin*) must
red several days or weeks in advance. Use this summary as
ng and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed	
Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Worksheets 5-11A, B, C, D	Review Questions - one worksheet per student
Slide 5-35	Of review questions
Slide 5-36	Of review questions
Slide 5-37	Of review questions
Slide 5-38	Of review questions
Tallysheet 5-5	

BSCS

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Core D Objectives for the Student:

1. Establish that water is a limited resource.
2. Establish that water is a vulnerable resource.
4. Establish that, as population increases, impact on environment increases.

ENVIRONMENTAL THEME:

Finiteness of Resources, Complementarity of Organisms and Environment

INQUIRY SKILLS:

Speculating

PROBLEM-SOLVING SKILLS:

Recognizing Problems and Formulating Questions

PRACTICAL APPLICATION:

Working in a Group, Developing Vocabulary, Reinforcing Reading Skills, Introduction to Community Problems

IVITY

ls for the Student:

Understand the need for water.

Recognize the sources of water.

Realize the problems associated with the preparation of usable water.

Realize the problems associated with the disposal of waste water.

Recognize the impact of water pollution.

Understand the broad problems of water management.

jectives for the Student:

Establish that water is a limited resource.

Establish that water is a vulnerable resource.

Establish that, as population increases, impact on environment increases.

THEME:
s of Resources, Complementarity of
and Environment

:
ng

G SKILLS:
ng Problems and Formulating Questions

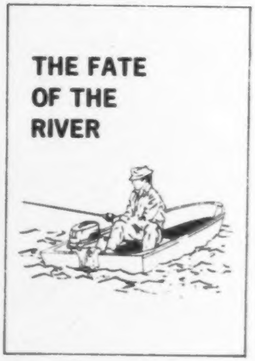
ICATION:
n a Group, Developing Vocabulary,
ng Reading Skills, Introduction
ity Problems

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE D.	WATER MANAGEMENT
ACTIVITY 5-17.	FATE OF THE RIVER

MATERIALS

Booklet, *Fate of the River*, 1 per student
*Tape recorder



*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-17. Fate of the River

This activity will be used to review many of the concept of water treatment covered earlier in this unit and to develop further the relationship between water quality and quality living.

The booklet, *Fate of the River*, may be used as a class oral reading exercise or as a silent reading experience with oral rereading for specific purposes. This booklet will provide the required information for a classroom discussion on water quality as it is related to quality living.

To introduce the story, say:

> THIS STORY (hold up the booklet) IS ABOUT TWO TOWNS THAT DON'T GET ALONG VERY WELL. BEFORE WE READ THE STORY, LET'S REVIEW SOME OF THE WORDS IN THE BOOKLET THAT WE ALREADY KNOW ABOUT.

Place the following list of vocabulary words on the chalkboard and discuss the meaning of each word. Have the students use the vocabulary words in sentences and recall where they studied the concepts. A definition similar to one the students might suggest is listed after the word. Do not put this meaning on the chalkboard. It is for your use only.

Source: where something begins, where you get something.

TEACHING STRATEGIES

Fate of the River

ill be used to review many of the concepts
ent covered earlier in this unit and to
the relationship between water quality
ing.

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discuss the meaning of each word. Have
e the vocabulary words in sentences and
ey studied the concepts. A definition
the students might suggest is listed
Do not put this meaning on the chalk-
or your use only.

e something begins, where you get
thing.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--participate in a discussion of vocabulary words.*
- *--read, or listen to, the story* Fate of the River.
- *--participate in a discussion of the story.*
- *--associate the decrease in water quality with growth and industrialization.*
- *--participate in a committee group that suggests solutions to the problem.*
- *--participate as a voter and demonstrate by his vote that he has inferred that water quality is related to the quality of life.*

Students should:

--discuss and define the vocabulary words listed.

MATERIALS

TEACHING STRATEGIES

Settling basin: a tank in a water treatment plant where the sediment or dirt particles in the water are allowed to settle to the bottom.

Filter plant: a tank with several layers of sand, gravel, or rock through which water filters from top to bottom, removing foreign particles.

Microbes: microscopic living things.

Chlorine: a chemical put into the water at water treatment plants to kill the microbes.

Pollution: something in the water that does not belong there.

Phosphates: a chemical found in detergents that encourages plant growth.

Sewage: human wastes put into the water.

Solid: something you can hold that keeps its shape or form.

Fertilizers: a material that helps things to grow.

Liquid: something that's runny and does not hold its shape.

Untreated water: nothing has been put into the water to make it any cleaner than it is.

Detergents: a cleaner, soap for dishes or clothes.

Committee: a group of people who decide something.

NOW LET'S READ THE STORY.

Distribute the booklets and ask the students to read them either silently or orally, as appropriate for the class.

TEACHING STRATEGIES

a tank in a water treatment plant where the sediment or dirt particles in the water are allowed to settle to the bottom.

tank with several layers of sand, ravel, or rock through which water ilters from top to bottom, removing oreign particles.

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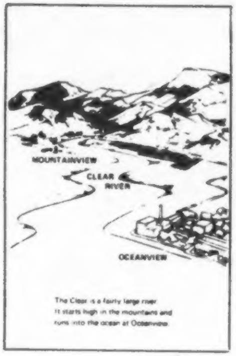
THE STORY.

lets and ask the students to read them orally, as appropriate for the class.

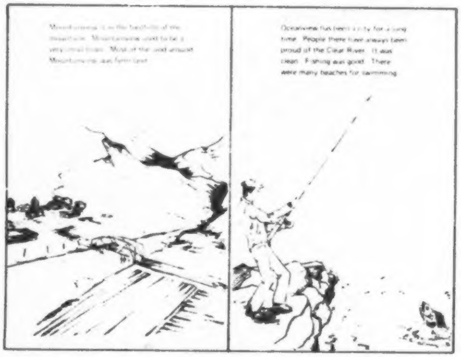
ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
5-17

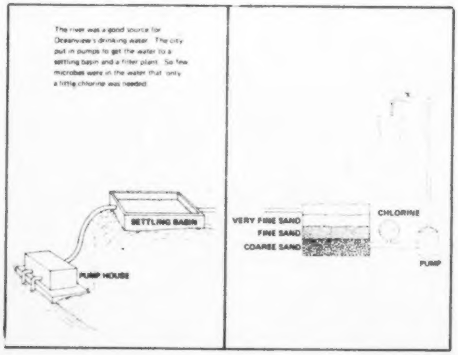
MATERIALS



The Clear is a fairly large river. It starts high in the mountains and runs into the ocean at Oceanview.



Oceanview has been a city for a long time. People there have always been proud of the Clear River. It was clean. Fishing was good. There were many beaches for swimming.



The river was a good source for Oceanview's drinking water. The city put in pumps to get the water to a settling basin and a filter plant. So few microbes were in the water that only a little chlorine was needed.

TEACHING STRATEGIES

Before selecting the Mountainview and Oceanview committees, go through the booklet again and have the students discuss the following questions. Oral or silent rereading may help in arriving at the answers; it should be encouraged.

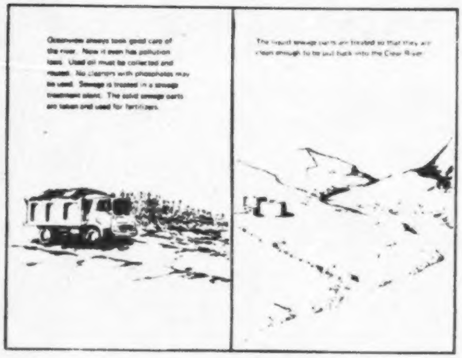
GI
STUDE
T

WHERE IS THE SOURCE OF THE CLEAR RIVER?	(page
WHICH TOWN DOES THE WATER FLOW THROUGH FIRST?	(page
WHAT ARE FOOTHILLS?	(page
WHICH TOWN GREW BIG FIRST?	(page
WHICH TOWN WAS THE FIRST TO TREAT THE WATER?	(page
WHERE DOES THE MOUNTAINVIEW AND OCEANVIEW WATER SUPPLY COME FROM?	(page
WHICH TOWN DOES THE WATER BELONG TO?	(pages 5-8)
WHY WAS VERY LITTLE CHLORINE NEEDED IN THE WATER?	(page
WHY DIDN'T THE WATER FROM MOUNTAINVIEW BOTHER OCEANVIEW PEOPLE WHEN MOUNTAINVIEW WAS A FARM COMMUNITY?	(pages 6-12)

TEACHING STRATEGIES		ANTICIPATED STUDENT BEHAVIORS
		Students should:
ing the Mountainview and Oceanview o through the booklet again and have the ss the following questions. Oral or ing may help in arriving at the answers; it uraged.		
THE SOURCE OF THE CLEAR RIVER?	(page 5)	--respond, "In the mountains."
N DOES THE WATER FLOW THROUGH	(page 5)	--respond, "Mountainview."
FOOTHILLS?	(page 6)	--respond, "Smaller mountains," "The hills before you get to the mountains," "Close to the mountains."
N GREW BIG FIRST?	(page 7)	--respond, "Oceanview."
N WAS THE FIRST TO TREAT THE	(page 8)	--respond, "Oceanview."
S THE MOUNTAINVIEW AND OCEANVIEW PLY COME FROM?	(page 8)	--respond, "From the Clear River."
N DOES THE WATER BELONG TO?	(pages 5-8)	--respond, "Both towns."
ERY LITTLE CHLORINE NEEDED IN THE	(page 8)	--respond, "Because the river was clean," "There weren't many microbes in it."
T THE WATER FROM MOUNTAINVIEW EANVIEW PEOPLE WHEN MOUNTAINVIEW M COMMUNITY?	(pages 6-12)	--infer it was smaller and did not have factories and other polluters; a treatment plant was not needed.

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

MATERIALS


Oceanview always took good care of the river. Now it even has pollution laws. Used oil must be collected and reused. No cleaners with phosphates may be used. Sewage is treated in a sewage treatment plant. The solid sewage parts are taken and used for fertilizers.

The liquid sewage parts are treated so that they are clean enough to be put back into the Clear River.

But upstream, Mountainview is not the place it used to be. The Clear River water made it a good place for industry. Each new factory added many new families with their wastes and cars. Mountainview grew too fast to plan for so many people.

MOUNTAINVIEW
CLEAR RIVER
OCEANVIEW

There are no cities above Mountainview. The water flowing into Mountainview remains clean. Mountainview has no pollution laws and no sewage treatment plant. All wastes go into the Clear River untreated. But where does the river with all these wastes go?

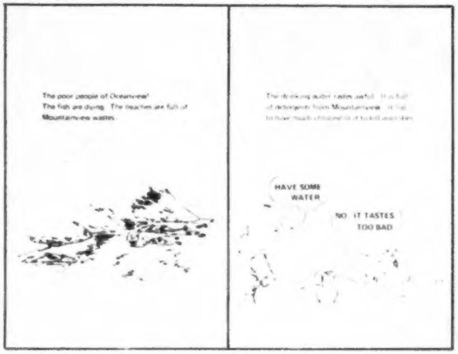
TEACHING STRATEGIES

WHY DOES OCEANVIEW HAVE LAWS ABOUT PUTTING OIL AND DETERGENTS IN THE RIVER?	(page 10)
WOULD A SEWAGE TREATMENT PLANT BE SOMETHING LIKE A WATER TREATMENT PLANT? WHY?	(pages 10 & 11)
WHERE DOES THE WATER GO AFTER IT PASSES OCEANVIEW?	(page 5)
HOW DID MOUNTAINVIEW CHANGE?	(pages 12 & 13)
WHY DID IT CHANGE?	(pages 12 & 13)
WHAT PROBLEMS HAS THE GROWTH OF MOUNTAINVIEW CAUSED?	(pages 16 & 17)
WHY ARE THE FISH DYING?	(page 14)
WHY DOES THE WATER IN OCEANVIEW TASTE SO BAD?	(page 16)
WHY DON'T MOUNTAINVIEW FACTORIES WANT TO CLEAN THINGS UP?	(page 18)
WHY DOESN'T MOUNTAINVIEW WANT TO BUILD A SEWAGE TREATMENT PLANT?	(page 18)

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ANVIEW HAVE LAWS ABOUT PUTTING RGENTS IN THE RIVER? (page 10)	--respond, "So they won't pollute the river."
GE TREATMENT PLANT BE SOMETHING TREATMENT PLANT? WHY? (pages 10 & 11)	--infer that because they separate solids and liquids and treat the water, they would be similar.
HE WATER GO AFTER IT PASSES (page 5)	--respond, "The ocean."
TAINVIEW CHANGE? (pages 12 & 13)	--respond, "More factories," "More people," "More cars and more wastes."
HANGE? (pages 12 & 13)	--respond, "Because people thought it was a good place to live, and came there."
S HAS THE GROWTH OF CAUSED? (pages 16 & 17)	--respond, "Water pollution," "Dead fish," "Bad water."
FISH DYING? (page 14)	--respond, "Because the water is so dirty."
WATER IN OCEANVIEW TASTE SO (page 16)	--respond, "The water is so dirty that they have to put lots of chlorine in it."
NTAINVIEW FACTORIES WANT GS UP? (page 18)	--respond, "Because it will cost too much."
OUNTAINVIEW WANT TO BUILD TMENT PLANT? (page 18)	--respond, "Because it will make taxes go up."

ACTIVITY
5-17

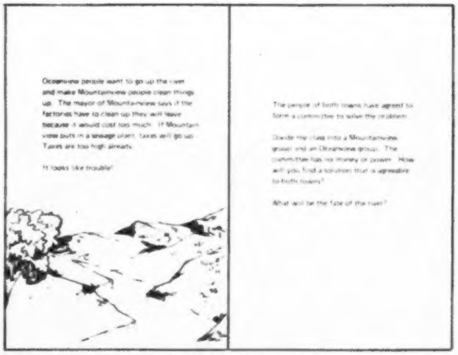
MATERIALS



The poor people of Oceanview!
The fish are dying. The beaches are full of Mountainview wastes.

The drinking water tastes awful. It is full of detergents from Mountainview. It has to have much chlorine in it to kill [illegible]

HAVE SOME WATER
NO. IT TASTES TOO BAD



Oceanview people want to go up the river and make Mountainview people clean things up. The mayor of Mountainview says if the factories have to clean up they will leave because it would cost too much. If Mountainview puts in a sewage plant, taxes will go up. Taxes are too high already.

It looks like trouble!

The people of both towns have agreed to form a committee to solve the problem.

Divide the class into a Mountainview group and an Oceanview group. The committee has no money or power. How will you find a solution that is agreeable to both towns?

What will be the fate of the river?

TEACHING STRATEGIES

After students have discussed the problems and answered the questions, select the Mountainview and Oceanview committee groups. Instruct them to get together and attempt to solve the problems. Do not dominate the discussion. Allow the students to interact freely.

Leave the structuring of the groups and committee organization up to the students.

Suggest that the findings and suggestions of the committe be broadcasted to the communities of Oceanview and Mountainview.

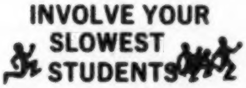
Choose a spokesman and have him tape-record his interpretations of the findings and the suggestions of the groups. This should be done so that the rest of the clas cannot hear the recording. Then play back the recording to the entire class as if it were a radio broadcast.

Have the two committee groups again react, but this time have the students imagine themselves as voting citizens of each community.

TEACHING STRATEGIES

have discussed the problems and answered
select the Mountainview and Oceanview
s. Instruct them to get together and
e the problems. Do not dominate the dis-
the students to interact freely.

turing of the groups and committee
to the students.



DISCUSSION TIME

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to the communities of Oceanview and

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recording. Then play back the recording
lass as if it were a radio broadcast.

mittee groups again react, but this time
s imagine themselves as voting citizens
y.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--attempt to solve the problems as a group.

--listen to the broadcast.

--demonstrate by their willingness to cooperate in cleaning up the river that they have inferred water quality is related to quality of life.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have read, or listened to the story, Fate of the River.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE D
ACTIVITY 5-17

Teacher ______________

Activity name suggested by class:

BSCS USE:	Post ____	Tally ____	Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes — Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How many students had difficulty reading the story?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How many students had difficulty reading the story?

13. Did the students work well in the two committees? ☐ Yes ☐ No

14. Did you have to give a great amount of input to the committee discussions?
☐ Yes ☐ No Comments.

Side A

UNIT V, CORE D
ACTIVITY 5-17

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: ESCP Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.
6. Understand the broad problems of water management.

Core D Objectives for the Student:

1. Establish that water is a limited resource.
2. Establish that water is a vulnerable resource.

ENVIRONMENTAL THEME:

Complementarity of Organisms and Environment, Finiteness of Resources, Ecological Trade-offs

INQUIRY SKILLS:

Value Judging

PROBLEM-SOLVING SKILLS:

Identifying Variables

PRACTICAL APPLICATION:

How To Use Less Water, Developing Vocabulary, Encouraging Discussion

CTIVITY

oals for the Student:

. Understand the need for water.

. Recognize the sources of water.

. Understand the broad problems of water management.

Objectives for the Student:

. Establish that water is a limited resource.

. Establish that water is a vulnerable resource.

L THEME:
entarity of Organisms and Environment,
ess of Resources, Ecological Trade-offs

LS:
udging

ING SKILLS:
ying Variables

PLICATION:
Use Less Water, Developing Vocabulary,
ging Discussion

BSCS

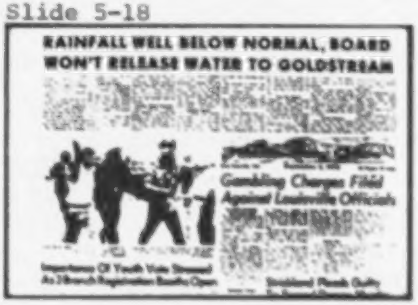
UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE D.	WATER MANAGEMENT
ACTIVITY 5-18.	SAVE THE SALMON

ACTIVITY
5-18

MATERIALS

Slides 5-18 through 5-28
*35 mm Slide projector
*Variety of art supplies and
  magazines
*Paper to make a mural

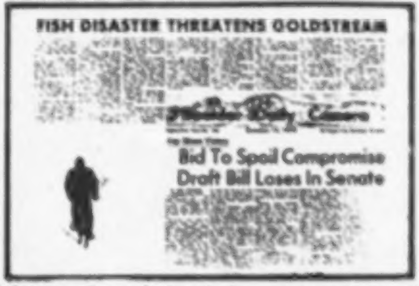
Slide 5-18



RAINFALL WELL BELOW NORMAL, BOARD WON'T RELEASE WATER TO GOLDSTREAM

Gambling Charges Filed Against Louisville Officials

Slide 5-19



FISH DISASTER THREATENS GOLDSTREAM

Bid To Spoil Compromise Draft Bill Loses In Senate

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-18. Save the Salmon

This activity is designed to establish a specific need f water conservation. The slides and discussion are relat to an actual environmental situation that occurred in Canada.

Part I.

Project Slide 5-18.

DAILY CAMERA
September 5, 1970

RAINFALL WELL BELOW NORMAL
BOARD WON'T RELEASE WATER TO GOLD STREAM

Read the headlines and ask:

WHAT IS GOLD STREAM?

WHAT IS THIS BOARD THE PAPER IS TALKING ABOUT?

Establish that Gold Stream is a stream. If students do not know what a water board is, tell them it is a group people who make decisions about the city's water.

WHAT DO THE HEADLINES TELL YOU?

WHAT IS THE DATE OF THE HEADLINE?

Project Slide 5-19.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
Save the Salmon *s designed to establish a specific need for ion. The slides and discussion are related vironmental situation that occurred in*	*During this activity, each student should:* *--observe and participate in a discussion of Slides 5-18 through 5-28.* *--recognize the need to conserve water.* *--conclude that individual action can have an enormous impact.* *--select an illustration for each of the three parts of the mural.* *--explain each illustration for the class mural.* Students should:
-18. DAILY CAMERA September 5, 1970 RAINFALL WELL BELOW NORMAL WON'T RELEASE WATER TO GOLD STREAM es and ask: D STREAM?	--respond, "Town," "City," "River," "Lake," "Stream."
S BOARD THE PAPER IS TALKING ABOUT? old Stream is a stream. If students do water board is, tell them it is a group of decisions about the city's water.	--speculate about what the "Board" means.
HEADLINES TELL YOU?	--respond with something about the water in Gold Stream and that rainfall is below normal.
DATE OF THE HEADLINE?	--respond, "September 5, 1970." (This will establish a starting point for the general time sequence that follows.)
19.	

DAILY CAMERA
October 14, 1970

FISH DISASTER THREATENS GOLD STREAM

Read the headline aloud and ask:

WHAT DOES THIS SLIDE TELL US ABOUT GOLD STREAM?

WHAT IS A DISASTER?

WHY DO YOU SUPPOSE THERE IS GOING TO BE A DISASTER?

WHAT IS THE DATE OF THIS HEADLINE?

Slide 5-20

Project Slide 5-20.

DAILY CAMERA
October 19, 1970

SAVE THAT WATER!

October 21, 1970

FISH COME FIRST, THEN SHINY CARS

October 22, 1970

SAVE THE SALMON, PAY $150,000

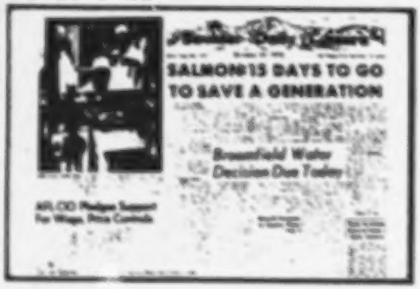
Read and discuss each headline and ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
DAILY CAMERA October 14, 1970	
SASTER THREATENS GOLD STREAM	
aloud and ask:	
S SLIDE TELL US ABOUT GOLD STREAM?	--respond that it is threatened with a fish disaster.
ASTER?	--respond, "Something terrible," "Something bad."
PPOSE THERE IS GOING TO BE A	--infer that there will be a disaster because there is not enough rain.
ATE OF THIS HEADLINE?	--respond, "October 14, 1970."
.	
DAILY CAMERA October 19, 1970	
SAVE THAT WATER!	
October 21, 1970	
ME FIRST, THEN SHINY CARS	
October 22, 1970	
HE SALMON, PAY $150,000	
ach headline and ask:	

ACTIVITY
5-18

MATERIALS

Slide 5-21



SALMON: 15 DAYS TO GO TO SAVE A GENERATION

Broomfield Water Decision Due Today

AFL-CIO Pledges Support For Wage, Price Controls

Slide 5-22

Slide 5-23

TEACHING STRATEGIES

WHAT MORE DO WE KNOW ABOUT THE DISASTER AND GOLD STREAM AFTER READING THESE HEADLINES?

Project Slide 5-21.

DAILY CAMERA
October 27, 1970

SALMON: 15 DAYS TO GO TO SAVE A GENERATION

Ask:

WHAT DO YOU THINK THESE ARTICLES ARE ABOUT?

WHAT IS A GENERATION?

Assist the students with this definition.

WHAT GENERATION NEEDS TO BE SAVED?

Project Slide 5-22 and say:

GOLD STREAM FLOWS OUT OF THE HILLS THAT SUPPLY WATER TO THE CITY OF VICTORIA.

Project Slide 5-23 and say:

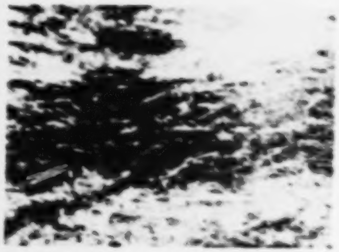
VICTORIA IS THE CAPITAL CITY OF BRITISH COLUMBIA IN CANADA.

Project Slide 5-24 and say:

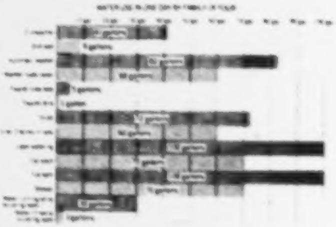
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
DO WE KNOW ABOUT THE DISASTER AND AM AFTER READING THESE HEADLINES?	--conclude that the disaster has something to do with water, that fish are more important than shiny cars, that the fish are salmon, that it will cost $150,000 to save the salmon, and that people are involved with the problem.
5-21. DAILY CAMERA October 27, 1970 15 DAYS TO GO TO SAVE A GENERATION	
OU THINK THESE ARTICLES ARE ABOUT?	--conclude that the articles are about a stream with salmon. The salmon don't have enough water and there are only fifteen days left to save the salmon.
GENERATION?	--respond, "An age group," "A bunch of people."
dents with this definition.	
RATION NEEDS TO BE SAVED?	--respond, "The fish."
-22 and say:	
AM FLOWS OUT OF THE HILLS THAT SUPPLY HE CITY OF VICTORIA.	
-23 and say:	
S THE CAPITAL CITY OF BRITISH COLUMBIA	
-24 and say:	

MATERIALS

Slide 5-24



Slide 5-25



TEACHING STRATEGIES

THE SUMMER OF 1970 WAS THE THIRD DRY SUMMER IN A ROW FOR THE GOLD STREAM HILLS. GOLD STREAM HAD SO LITTLE WATER IN IT THAT SALMON WAITING TO COME IN TO LAY THEIR EGGS COULD NOT SWIM. THE SALMON WOULD SWIM INTO THE STREAM ONLY TO BE STOPPED BY THE SHALLOW WATER.

EACH PERSON IN CITIES LIKE VICTORIA USES FIFTY OR MORE GALLONS OF WATER EVERY DAY. HOW MUCH WATER IS THAT?

IF EVERY PERSON IN VICTORIA SAVED 25 GALLONS OF WATER EACH DAY - IN OTHER WORDS, CUT HIS WATER USAGE IN HALF, THERE WOULD BE 1,250,000 GALLONS OF WATER THAT COULD BE SENT DOWN THE GOLD STREAM RIVER TO SAVE THE SALMON.

Project Slide 5-25 to help students remember some of the many water uses they have identified. Say:

HERE IS A PICTURE OF SOME OF THE WAYS WE USE WATER. IF YOU WERE LIVING IN VICTORIA IN 1970, HOW WOULD YOU HAVE SAVED WATER?

PRETEND IT IS NOW A WEEK LATER. WHAT WILL COME FIRST, THE CITY AND ITS PEOPLE, OR THE SALMON? IF IT DOES NOT RAIN SOON, IT MAY MEAN THE PEOPLE IN THE CITY WILL BE SHORT OF WATER ALL WINTER.

TEACHING STRATEGIES

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NOT RAIN SOON, IT MAY MEAN THE PEOPLE
WILL BE SHORT OF WATER ALL WINTER.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--comment, "A lot," "About as much as two bathtubs," and so forth.

--suggest, "Take fewer baths," "Don't peel vegetables or potatoes under running water," "Don't leave water running when brushing teeth," "Use suds saver on automatic washing machine," "Don't wash car," "Don't use automatic dishwasher - use a pan," "Fix leaky faucets," "Don't water lawn," "Don't flush toilet every time you use it."

ACTIVITY
5-18

MATERIALS

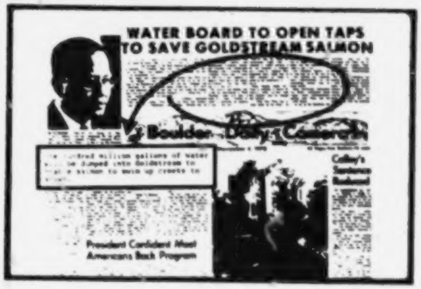
TEACHING STRATEGIES

Direct the class members to make a decision about whether they would release water for the salmon.

Ask:

WHAT DO YOU THINK THE CITY OF VICTORIA DID?

Slide 5-26



WATER BOARD TO OPEN TAPS TO SAVE GOLDSTREAM SALMON

Boulder Daily Camera

Calley's Sentence Reduced

President Confident Most Americans Back Program

Project Slide 5-26.

DAILY CAMERA
November 4, 1970

WATER BOARD TO OPEN TAPS TO SAVE
GOLD STREAM SALMON

> "One hundred million gallons of water will be dumped in Gold Stream to enable salmon to swim upstream to spawn."

Read and discuss the headline and ask:

HOW MUCH WATER DO YOU THINK THE PEOPLE OF VICTORIA SAVED BY NOT WASHING CARS AND BY DOING THE OTHER THINGS WE TALKED ABOUT?

WHAT DOES THE WORD "SPAWN" MEAN?

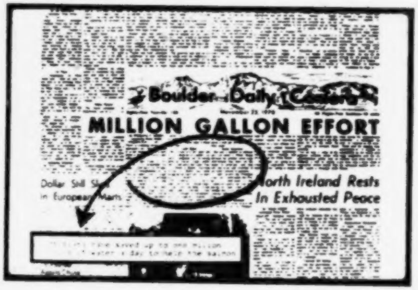
Assist the students in defining this word as "laying eggs."

DISCUSSION TIME

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
members to make a decision about whether se water for the salmon.	--decide either to have water for the city or for the salmon, or possibly some water for both.
THINK THE CITY OF VICTORIA DID?	--speculate on the actions that people in the city of Victoria took.
26. DAILY CAMERA November 4, 1970 R BOARD TO OPEN TAPS TO SAVE GOLD STREAM SALMON d million gallons of water will be old Stream to enable salmon to swim spawn." the headline and ask:	
TER DO YOU THINK THE PEOPLE OF VED BY NOT WASHING CARS AND BY THER THINGS WE TALKED ABOUT?	--speculate on the amount of water saved and recall that if each person saved 25 gallons a day, 1,250,000 gallons would be saved.
HE WORD "SPAWN" MEAN?	--speculate on the definition of spawn.
nts in defining this word as "laying	

MATERIALS

Slide 5-27



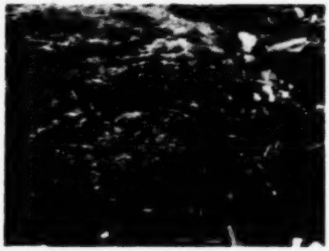
Boulder Daily Camera

MILLION GALLON EFFORT

Dollar Still Sl
in European Marts

North Ireland Rests
In Exhausted Peace

Slide 5-28



TEACHING STRATEGIES

Project Slide 5-27.

DAILY CAMERA
November 25, 1970

MILLION GALLON EFFORT

> "Victorians have saved up to one million gallons of water a day to help the salmon."

LIFE RETURNS TO GOLD STREAM

Read and discuss the headline of Slide 5-27.

Ask:

> WHAT DOES "LIFE RETURNS TO GOLD STREAM" MEAN?

> WHAT IS THE DATE OF THIS HEADLINE?

Briefly continue discussion on the time period between the first and last headline (about three months).

Project Slide 5-28 and say:

> THIS SLIDE SHOWS THE SALMON SPAWNING IN GOLD STREAM. WHY IS IT IMPORTANT THAT PEOPLE IN VICTORIA CONTINUE TO BE CAREFUL ABOUT USING WATER?

> WHAT OTHER KINDS OF THINGS COULD HAPPEN IF PEOPLE USED UP A GREAT DEAL OF THE WATER IN THE STREAMS AND RIVERS.

TEACHING STRATEGIES

7.

DAILY CAMERA
November 25, 1970

MILLION GALLON EFFORT

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y to help the salmon."

E RETURNS TO GOLD STREAM

he headline of Slide 5-27.

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E CAREFUL ABOUT USING WATER?

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P A GREAT DEAL OF THE WATER IN
ND RIVERS.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--interpret the headline and reply, "The fish can live there now," "The fish can have babies," "They put water in the stream."

--respond, "November 25, 1970."

--infer that it takes time for people to work together, to get things done.

--respond, "So that Gold Stream will always have water for the salmon."

--speculate, "Water plants would die," "Fish, frogs, and tadpoles would have to live elsewhere," "There would be a smaller source of drinking water."

MATERIALS

TEACHING STRATEGIES

DIS

ENCO
CREA
IDE

Part II.

This part of the activity is designed to assess student understanding of the three ideas outlined in this activity:

1. The effects of using up water in the environment, e.g., rivers and streams.

2. Ways of conserving water.

3. The impact of individual action in conserving water.

Before class, tack the mural paper to a bulletin board. Using a yardstick and black felt pen, divide the paper into three sections. Label the sections at the top in whatever way will be easiest for your students - either titles or numbers. Sketch a river or lake in Sections 1 and 3, leaving ample space for student pictures.

Tell students that they are going to make a class mural that tells a story in three parts. Be sure they understand that a mural is a picture that is hung on the wall Have them recall the previous discussion of the salmon, including the decrease in water, ways of conserving wate and the positive effect of conserving water.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

DISCUSSION TIME

ENCOURAGE
CREATIVE
IDEAS

he activity is designed to assess student
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decrease in water, ways of conserving water,
ve effect of conserving water.

MATERIALS

TEACHING STRATEGIES

Then say:

> EACH OF YOU IS TO DRAW OR CUT OUT FROM MAGAZINES SOMETHING TO SHOW (1) WHAT CAN HAPPEN TO THE ENVIRONMENT WHEN THERE ISN'T ENOUGH WATER, (2) WAYS PEOPLE CAN SAVE WATER, AND (3) WHAT WILL HAPPEN AFTER THEY SAVE WATER.

Clarify as needed and ask students what they might draw or cut out for each section of the mural. Some possibilities are:

1. Salmon unable to spawn, dying frogs or fish, dead water plants, lowered water level in the pond or river, grasses parched by the dryness, and so forth.

2. Water shut off while brushing teeth or peeling vegetables, dirty cars, fixing leaky faucets, water sprinkler shut off, and so forth.

3. Fish, frogs, and water plants thriving and plentiful; raised water level; lush green color; salmon eggs; and so forth.

Tell the students when they have finished, to bring their pictures to the mural paper and explain to you where their pictures belong as they paste them on. Note which students are having difficulty with any of the sections so you can plan to assist them with additional instruction as necessary.

When students have finished, ask them to suggest an appropriate title for the mural and vote on it. Allow interested students to complete the mural by filling in empty spaces with drawings, pictures, torn paper, and so on. Besides cluing you on the success of individual students, the mural will provide an attractive and meaningful bulletin board.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

IS TO DRAW OR CUT OUT FROM MAGAZINES
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WHEN THERE ISN'T ENOUGH WATER, (2)
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oard.

ACTIVITY
5-18

MATERIALS

TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Upon completion of this activity, each student should, as a minimum: *--have observed Slides 5-18 through 5-28.* *--have recognized the need to conserve water.* *--have participated in making a class mural.*

UNIT V, CORE D
ACTIVITY 5-18

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO:	1/4	1/2	3/4	ALL
HIGH INTEREST						
MODERATE INTEREST OR INDIFFERENCE						
RESISTANCE OR DISLIKE						

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Could the students follow the story from the newspaper headlines? ☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Could the students follow the story from the newspaper headlines? ☐ Yes ☐ No

13. Did all students contribute to the construction of the mural? ☐ Yes ☐ No Comment.

14. When the mural is completed send a Polaroid picture of it to BSCS. (You may also wish to send the mural when you have finished using it as a bulletin board.)

Side A

UNIT V, CORE D
ACTIVITY 5-18

Teacher ________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.
6. Understand the broad problems of water management.

Core D Objectives for the Student:

1. Establish that water is a limited resource.
3. Establish that, as population increases, demands upon resources increase.
4. Establish that, as population increases, impact on environment increases.

ENVIRONMENTAL THEME:

Population Dynamics, Finiteness of Resources

INQUIRY SKILLS:

Translating

PROBLEM-SOLVING SKILLS:

Organizing Data

PRACTICAL APPLICATION:

Construction and Comprehension of a Graph, Eye-hand Coordination, Need for Conserving Water

ACTIVITY

Goals for the Student:

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3. Understand the broad problems of water management.

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UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE D.	WATER MANAGEMENT
ACTIVITY 5-19.	POPULATION VERSUS WATER SUPPLY

BSCS

ACTIVITY
5-19

MATERIALS

Worksheets 5-8 through 5-10
Slides 5-29 through 5-34
*Data on rainfall, population, and water consumption for your own locality -- 1900 to 1970 (These data should be available from the weather bureau, water department, or chamber of commerce.)
*Graph paper, 3 sheets per student of 1/2-inch grid or larger

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-19. Population Versus Water Supply

This activity provides a review of the previous activiti related to water. In addition, graphing is used to help the student conclude that there is a need for conservati of water.

NOTE: You should not attempt to complete this activity in less than two class periods.

Begin the activity by referring to the story, *Fate of the River*.

Say:

> THE STORY ABOUT SALMON WHICH WE READ EARLIER, IS A STORY WITH A HAPPY ENDING. BUT WHAT ABOUT TOWNS LIKE OCEANVIEW OR MOUNTAINVIEW? DO PEOPLE IN TOWNS LIKE THESE NEED TO BE CONCERNED ABOUT WATER?

TEACHING STRATEGIES

Population Versus Water Supply

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ABOUT SALMON WHICH WE READ EARLIER, IS A A HAPPY ENDING. BUT WHAT ABOUT TOWNS VIEW OR MOUNTAINVIEW? DO PEOPLE IN THESE NEED TO BE CONCERNED ABOUT

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

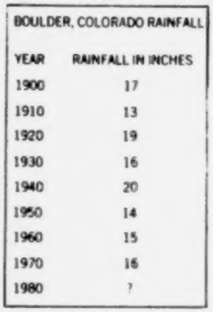
--construct a graph of annual rainfall for Boulder, Colorado, and for his local community.
--conclude that the amount of rainfall received at a particular locality does not change much from year to year.
--construct a graph of population growth for Boulder, Colorado, and for his local community.
--compare the rainfall and population graphs of Boulder and conclude that the population has risen sharply while the rainfall remained relatively constant.
--indicate a prediction for a trend in water use since 1900 in Boulder, Colorado.
--construct a graph of water use in Boulder and in the local community if data are available.
--conclude that water use has risen sharply and tends to follow population increase.
--predict a water shortage for Boulder and perhaps for the local community.
--infer the need for water conservation.

Students should:

--recall that Mountainview created problems for Oceanview, and that these towns do need to be concerned about water.

MATERIALS

Slide 5-29



BOULDER, COLORADO RAINFALL

YEAR	RAINFALL IN INCHES
1900	17
1910	13
1920	19
1930	16
1940	20
1950	14
1960	15
1970	16
1980	?

TEACHING STRATEGIES

Review the plight of these two cities on the Clear River. Relate the problems of Oceanview and Mountainview to problems of the students' own community by asking:

WHERE DOES OUR DRINKING WATER COME FROM?

COULD A PROBLEM SIMILAR TO THE ONE IN OCEANVIEW AND MOUNTAINVIEW OCCUR HERE?

Using knowledge based on the previous activity (5-16) concerning water cycles, trace the local source of water from reservoir, lake, river, or well to rainfall.

Now ask:

DO YOU THINK THE AMOUNT OF WATER FROM RAINFALL CHANGES MUCH FROM YEAR TO YEAR? WHY?

Accept any reasonable answer and explanation at this point.

Say:

LET US LOOK AT THE AMOUNT OF RAINFALL IN BOULDER, COLORADO, SINCE 1900.

Project Slide 5-29. (Leave room lights on if possible.)

The following data appear on the slide:

EACHING STRATEGIES

of these two cities on the Clear River.
s of Oceanview and Mountainview to
udents' own community by asking:

R DRINKING WATER COME FROM?

EM SIMILAR TO THE ONE IN OCEANVIEW
IEW OCCUR HERE?

sed on the previous activity (5-16)
ycles, trace the local source of water
ke, river, or well to rainfall.

THE AMOUNT OF WATER FROM RAINFALL
FROM YEAR TO YEAR? WHY?

ble answer and explanation at this point.

T THE AMOUNT OF RAINFALL IN
RADO, SINCE 1900.

. (Leave room lights on if possible.)

appear on the slide:

ANTICIPATED STUDENT BEHAVIORS

Students should:

--state the source of their local water supply.

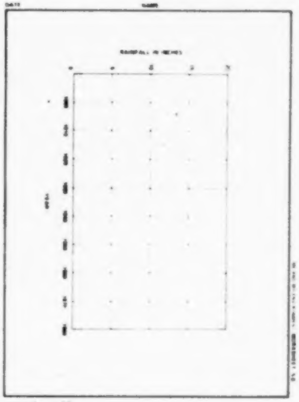
--predict whether or not a problem similar to this one could occur.

--respond, "Yes," "No," "Don't know," and attempt to explain why.

ACTIVITY
5-19

MATERIALS

Worksheet 5-8



TEACHING STRATEGIES

YEAR	RAINFALL IN INCHES
1900	17
1910	13
1920	19
1930	16
1940	20
1950	14
1960	15
1970	16
1980	?

Point out the column on the slide where the years appear and the column where the rainfall amount appears.

Ask:

> DID THE AMOUNT OF RAINFALL IN BOULDER CHANGE VERY MUCH FROM YEAR TO YEAR SINCE 1900?

> WE CAN MORE EASILY SEE HOW MUCH CHANGE THERE IS BY MAKING A GRAPH.

Distribute Worksheet 5-8 to each student.

Review the basic concepts of graph construction by askin

> REMEMBER WHAT A GRAPH IS?
> (Write "graph" on the chalkboard.)

TEACHING STRATEGIES

YEAR	RAINFALL IN INCHES
1900	17
1910	13
1920	19
1930	16
1940	20
1950	14
1960	15
1970	16
1980	?

olumn on the slide where the years appear
here the rainfall amount appears.

OUNT OF RAINFALL IN BOULDER CHANGE
FROM YEAR TO YEAR SINCE 1900?

ACCEPT ALL ANSWERS

EASILY SEE HOW MUCH CHANGE THERE
G A GRAPH.

heet 5-8 to each student.

concepts of graph construction by asking:

AT A GRAPH IS?
ph" on the chalkboard.)

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "No," "Yes," "Some."

--construct a rainfall line graph.

--recall graphing activities in Unit III and respond, "It's a picture of something," "It uses a line to tell you something."

MATERIALS

TEACHING STRATEGIES

Point to the vertical axis on the worksheet and say:

> THIS LINE SHOWS THE INCHES OF RAIN RECEIVED: FIVE, TEN, FIFTEEN, TWENTY.

Point to the horizontal axis and say:

> THIS LINE SHOWS THE YEARS: 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, and 1980.
>
> IN 1900 HOW MANY INCHES OF RAIN DID BOULDER RECEIVE?
>
> WHICH LINE ON OUR GRAPH WOULD BE CLOSEST TO SEVENTEEN INCHES?

Instruct the students to put a finger on 1900 and go up the line until they get to fifteen. Ask:

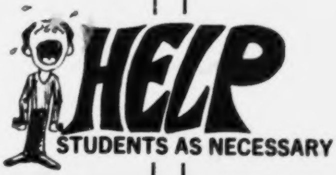
> IS SEVENTEEN MORE OR LESS THAN FIFTEEN?

Have the students put a dot a little above the fifteen-inch mark to represent seventeen inches. Be sure all students understand this process before you continue.

If students still seem to lack the graphing concept, plot one more point with them until they understand. Otherwise, instruct them to finish constructing the graph.

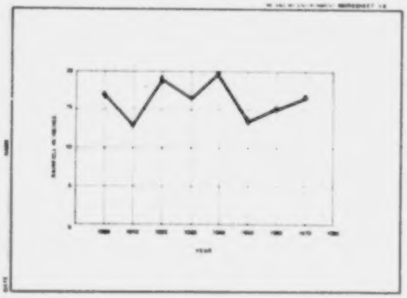
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ical axis on the worksheet and say: OWS THE INCHES OF RAIN RECEIVED: IFTEEN, TWENTY. zontal axis and say: OWS THE YEARS: 1900, 1910, 1920, 1950, 1960, 1970, and 1980. MANY INCHES OF RAIN DID BOULDER	--respond, "Seventeen inches."
N OUR GRAPH WOULD BE CLOSEST TO CHES?	--respond, "Fifteen."
ents to put a finger on 1900 and go up ey get to fifteen. Ask:	
MORE OR LESS THAN FIFTEEN?	--respond, "More."
put a dot a little above the fifteen- sent seventeen inches. Be sure all d this process before you continue. seem to lack the graphing concept, plot h them until they understand. t them to finish constructing the graph.	

HAVE YOU INVOLVED ALL STUDENTS?



MATERIALS

Slide 5-30



TEACHING STRATEGIES

When students have plotted all the points, instruct them to connect the points in order to form a line.

Project Slide 5-30, which shows a completed Worksheet 5- Have students compare their graphs with the one projecte Then ask:

WHAT KIND OF A LINE DO YOU SEE ON YOUR GRAPHS?

DOES THE LINE GO UP AND DOWN MUCH?

WHAT CAN WE LEARN FROM OUR GRAPH ABOUT THE RAINFALL FROM YEAR TO YEAR IN A PLACE SUCH AS BOULDER?

Make sure students see that, in spite of minor ups and downs, the overall average does not change much.

Now ask:

DOES THE AMOUNT OF RAINFALL HERE IN (name of local community) CHANGE MUCH FROM YEAR TO YEAR?

Place the local data for the past several years on the chalkboard in a way similar to that in Slide 5-29. (Yea need not coincide with Boulder data; however, students may have less trouble constructing graphs if it does.) Distribute a sheet of graph paper ruled with half-inch (or larger) squares to each of the students and have them construct a graph of local rainfall. On the chalkboard, draw a facsimile of the graph paper, putting rainfall in inches on the vertical axis and years on the horizontal axis. The students can then label their axes by copying your example. Remind them to graph the

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ave plotted all the points, instruct them points in order to form a line.	--connect the points plotted to form a line.
-30, which shows a completed Worksheet 5-8. ompare their graphs with the one projected.	--compare their graphs with the one projected.
OF A LINE DO YOU SEE ON YOUR GRAPHS?	--respond, "Crooked," "Wiggly."
INE GO UP AND DOWN MUCH?	--respond, "Just a little," "Not much."
E LEARN FROM OUR GRAPH ABOUT LL FROM YEAR TO YEAR IN A PLACE ULDER?	--interpret the graph and indicate that because the line stays fairly straight the rainfall does not change very much from year to year.
nts see that, in spite of minor ups and all average does not change much.	
MOUNT OF RAINFALL HERE IN (name of unity) CHANGE MUCH FROM YEAR TO	--predict that it probably does not; may respond, "Yes," "No," "Don't know."
data for the past several years on the way similar to that in Slide 5-29. (Years de with Boulder data; however, students rouble constructing graphs if it does.) eet of graph paper ruled with half-inch ares to each of the students and have a graph of local rainfall. On the chalk- acsimile of the graph paper, putting hes on the vertical axis and years on axis. The students can then label their your example. Remind them to graph the	

MATERIALS

TEACHING STRATEGIES

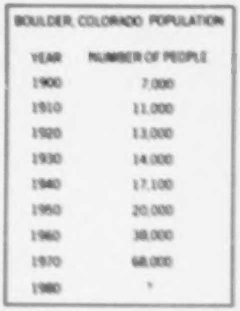
same way they did on Worksheet 5-8. Assist students as necessary.

GIVE S
TIME
TO
THINK

When the graphs are completed, have students compare them with the Boulder rainfall graph on Slide 5-30. Discuss the similarities and differences, finally asking:

> DOES THE RAINFALL CHANGE MUCH FROM YEAR TO YEAR IN OUR COMMUNITY?
>
> HOW CAN WE TELL?

Slide 5-31



BOULDER, COLORADO POPULATION

YEAR	NUMBER OF PEOPLE
1900	7,000
1910	11,000
1920	13,000
1930	14,000
1940	17,100
1950	20,000
1960	38,000
1970	68,000
1980	?

Project Slide 5-31. The following data appears on the slide.

BOULDER, COLORADO POPULATION

YEAR	NUMBER OF PEOPLE
1900	7,000
1910	11,000
1920	13,000
1930	14,000
1940	17,000
1950	20,000
1960	38,000
1970	68,000
1980	?

EACHING STRATEGIES

on Worksheet 5-8. Assist students as

GIVE STUDENTS
TIME
TO
THINK

e completed, have students compare them
ainfall graph on Slide 5-30. Discuss
nd differences, finally asking:

FALL CHANGE MUCH FROM YEAR TO
OMMUNITY?

LL?

. The following data appears on the

POPULATION

R	NUMBER OF PEOPLE
0	7,000
0	11,000
0	13,000
0	14,000
0	17,000
0	20,000
0	38,000
0	68,000
0	?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--compare local rainfall graph with that for Boulder.

--conclude that it does not.

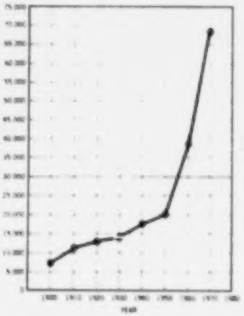
--conclude that because the line on the graph does not go up and down much, the rainfall did not change significantly.

ACTIVITY
5-19

MATERIALS

Worksheet 5-9

Slide 5-32



TEACHING STRATEGIES

Discuss the slide, pointing out the years mentioned and the number of people. Distribute Worksheet 5-9 to each student. Following the same strategy suggested in this activity for Worksheet 5-8, plot the first points on the graph together and then instruct the students to continue graphing the population of Boulder from 1900-1970.

Remind the students to connect the points on the graph t make a line.

When the students have completed their graphs, project Slide 5-32 for comparison and verification of their accuracy.

Now instruct the students to compare the rainfall and population graphs.

Ask:

HOW DO THE LINES OF THE RAINFALL AND POPULATION GRAPHS COMPARE?

HAS THE POPULATION OF BOULDER GONE UP OR DOWN?

WHY DO WE KNOW THAT?

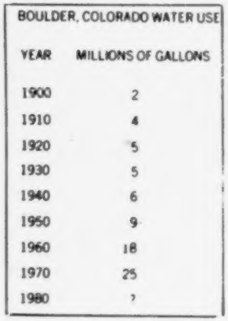
WHAT DO YOU THINK HAS HAPPENED TO THE POPULATION OF (name of local community) SINCE 1900?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
de, pointing out the years mentioned and eople. Distribute Worksheet 5-9 to each ving the same strategy suggested in this ksheet 5-8, plot the first points on er and then instruct the students to g the population of Boulder from 1900-	
nts to connect the points on the graph to	--construct a population line graph for Boulder.
s have completed their graphs, project omparison and verification of their	--compare their graphs with the one projected.
students to compare the rainfall and s.	
LINES OF THE RAINFALL AND POPULATION ARE?	--compare the graphs and indicate that the population line has risen sharply while the rainfall has not increased but stayed about the same.
ULATION OF BOULDER GONE UP OR DOWN?	--look at the graphs prepared and respond, "Up."
NOW THAT?	--respond, "Because the line goes up."
THINK HAS HAPPENED TO THE POPULATION local community) SINCE 1900?	--responses will vary, depending upon the locale and the experience of the students.

ACCEPT ALL ANSWERS

MATERIALS

Slide 5-33



BOULDER, COLORADO WATER USE

YEAR	MILLIONS OF GALLONS
1900	2
1910	4
1920	5
1930	5
1940	6
1950	9
1960	18
1970	25
1980	?

TEACHING STRATEGIES

Place the local population data for each decade since 1900 on the chalkboard in a way similar to that presented in Slide 5-31. Distribute a sheet of graph paper to each of the students and have them construct a graph of the local population. Assist students as necessary. Remind them to do it the same way they did Worksheet 5-9.

When the graphs are completed, have students compare them with the Boulder population growth graph. Discuss the similarities and differences, especially in the line direction.

Now ask:

> WHAT DO YOU THINK THE INCREASE IN POPULATION MIGHT DO TO THE AMOUNT OF WATER USED BY THE PEOPLE IN BOULDER, COLORADO?

Project Slide 5-33 and say:

> HERE IS INFORMATION ABOUT THE AMOUNT OF WATER USED BY THE PEOPLE IN BOULDER.

The data on Slide 5-33 are as follows:

BOULDER, COLORADO WATER USE

YEAR	MILLIONS OF GALLONS
1900	2
1910	4
1920	5
1930	5
1940	6
1950	9
1960	18
1970	25
1980	?

TEACHING STRATEGIES

ɔpulation data for each decade since 1900
in a way similar to that presented in
ribute a sheet of graph paper to each of
have them construct a graph of the local
st students as necessary. Remind them to
they did Worksheet 5-9.

re completed, have students compare them
population growth graph. Discuss the
differences, especially in the line

HINK THE INCREASE IN POPULATION
HE AMOUNT OF WATER USED BY THE
JLDER, COLORADO?

and say:

RMATION ABOUT THE AMOUNT OF WATER
EOPLE IN BOULDER.

5-33 are as follows:

WATER USE

AR	MILLIONS OF GALLONS
00	2
10	4
20	5
0	5
0	6
0	9
0	18
70	25
0	?

ANTICIPATED STUDENT BEHAVIORS

Students should:

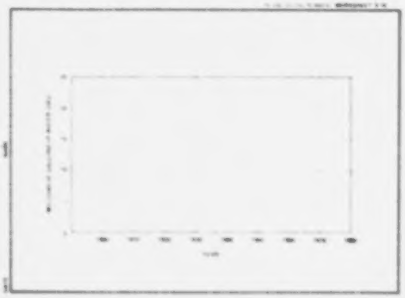
--compare the local population growth with that of Boulder.

--predict that the amount used might increase.

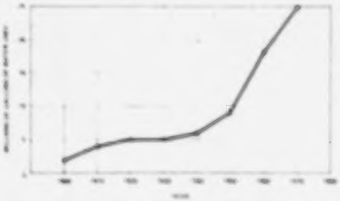
ACTIVITY
5-19

MATERIALS

Worksheet 5-10



Slide 5-34



TEACHING STRATEGIES

Discuss the slide until the students understand what is being presented.

Distribute Worksheet 5-10 to each student. Discuss both axes to familiarize the students with the graph.

Say:

> ON THIS WORKSHEET WE ARE GOING TO GRAPH THE AMOUNT OF WATER USED BY THE PEOPLE OF BOULDER, JUST AS WE DID WITH THE RAINFALL AND THE POPULATION. BEFORE WE DO THAT, DRAW A DOTTED LINE ON THE WORKSHEET SHOWING WHAT YOU PREDICT HAPPENED TO THE AMOUNT OF WATER USED FROM 1900 TO 1970.

Review the meaning of "predict," if necessary.

> NOW CONSTRUCT A GRAPH OF THE INFORMATION AND SEE IF YOUR PREDICTION IS CORRECT.

Assist students as necessary in completing their graphs.

Project Slide 5-34 for comparison and verification of accuracy.

Instruct the students to compare their graphs with Slide 5-34.

Now ask the students to look at the three graphs they ha made for Boulder, Colorado (Worksheets 5-8, 5-9, 5-10).

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ide until the students understand what is d.	
sheet 5-10 to each student. Discuss both rize the students with the graph.	
RKSHEET WE ARE GOING TO GRAPH THE AMOUNT SED BY THE PEOPLE OF BOULDER, JUST AS H THE RAINFALL AND THE POPULATION. DO THAT, DRAW A DOTTED LINE ON THE SHOWING WHAT YOU PREDICT HAPPENED TO OF WATER USED FROM 1900 TO 1970.	
ng of "predict," if necessary.	--indicate their predictions by drawing a dotted line on the worksheet.
CT A GRAPH OF THE INFORMATION AND PREDICTION IS CORRECT.	--graph the data for water consumption and compare it with their predictions.
s necessary in completing their graphs.	
4 for comparison and verification of	
ents to compare their graphs with Slide	--compare their water use graphs with the one projected.
nts to look at the three graphs they have Colorado (Worksheets 5-8, 5-9, 5-10).	

MATERIALS

TEACHING STRATEGIES

Ask:

WHAT HAS HAPPENED TO THE AMOUNT OF WATER USED BY THE PEOPLE IN BOULDER?

HOW DO YOU KNOW?

IS YOUR PREDICTION ACCURATE?

DOES THE GRAPH OF WATER USE LOOK MORE LIKE THE RAINFALL GRAPH OF THE POPULATION GRAPH?

WHY DO YOU THINK THIS IS SO?

DOES THE AMOUNT OF WATER AVAILABLE TO THE PEOPLE IN BOULDER CHANGE MUCH FROM YEAR TO YEAR?

WHAT WOULD YOU PREDICT WILL HAPPEN TO THE WATER SUPPLY IN BOULDER IF THE POPULATION CONTINUES TO GROW AS IT HAS IN THE PAST?

WHAT WOULD YOU PREDICT HAS HAPPENED TO THE WATER USE IN (name of local community) SINCE (date of first data available)?

Place the local water use data on the chalkboard in a way similar to that presented in Slide 5-33 and discuss it. Distribute a sheet of graph paper to each student.

DISTRIBUTE

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
PENED TO THE AMOUNT OF WATER PEOPLE IN BOULDER?	--indicate that it has increased sharply.
NOW?	--respond, "The line on the graph goes up."
ICTION ACCURATE?	--indicate yes or no.
PH OF WATER USE LOOK MORE LIKE THE PH OF THE POPULATION GRAPH?	--respond, "The population graph."
HINK THIS IS SO?	--infer that more people use more water.
UNT OF WATER AVAILABLE TO THE ULDER CHANGE MUCH FROM YEAR TO	--infer that it doesn't since the rainfall remains about the same.
DU PREDICT WILL HAPPEN TO THE IN BOULDER IF THE POPULATION GROW AS IT HAS IN THE PAST?	--predict that there will be a water shortage.
DU PREDICT HAS HAPPENED TO THE (name of local community) SINCE t data available)?	--predict that the water use has increased.
ter use data on the chalkboard in a way esented in Slide 5-33 and discuss it. of graph paper to each student.	

DISTRIBUTE MATERIALS

ACTIVITY
5-19

MATERIALS

TEACHING STRATEGIES

Have them construct a graph of local water use. Assist students as necessary. However, this is the third grap constructed so they should be able to work independentl

The local data will likely be similar to that for Bould If the data are not available, predictions may be made from the rainfall and population graphs for the local area.

When the graphs are constructed, or predictions made abo local water use, ask:

WHAT HAS HAPPENED TO THE WATER USE IN (name of local community?

HOW DO WE KNOW?

DOES THE AMOUNT OF WATER AVAILABLE INCREASE IN THE SAME WAY THAT WATER USE DOES?

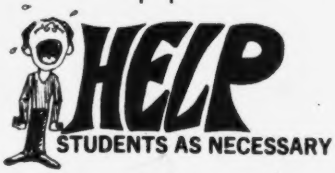
HOW DO WE KNOW?

WHAT MIGHT HAPPEN IF THE POPULATION OF (name of local community) CONTINUES TO GROW?

SHOULD YOU BE CONCERNED ABOUT HOW YOU USE WATER?

WHAT COULD A CITY LIKE BOULDER (or local city) DO TO KEEP FROM RUNNING OUT OF WATER?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ruct a graph of local water use. Assist cessary. However, this is the third graph they should be able to work independently.	
will likely be similar to that for Boulder. not available, predictions may be made ll and population graphs for the local	
are constructed, or predictions made about , ask:	
APPENED TO THE WATER USE IN (name ommunity?	--respond, "Gone up."
KNOW?	--respond, "The line on the graph goes up."
MOUNT OF WATER AVAILABLE INCREASE IN AY THAT WATER USE DOES?	--respond, "No."
KNOW?	--respond, "Look on the rainfall map," "The line stays about the same."
HAPPEN IF THE POPULATION OF (name ommunity) CONTINUES TO GROW?	--infer that the community might run short of water.
BE CONCERNED ABOUT HOW YOU USE WATER?	--infer the need for water conservation.
A CITY LIKE BOULDER (or local city) DO OM RUNNING OUT OF WATER?	--suggest various ideas including limiting population growth, rationing the use of water, getting more water from somewhere else, and so forth.



MATERIALS

TEACHING STRATEGIES

Accept and discuss all responses. Make sure the students understand that water is a finite resource, i.e., a city usually cannot import water from somewhere else without causing a shortage at that place. A review of the rainfall graphs should serve to emphasize that there is only so much water available at any location.

TEACHING STRATEGIES

s all responses. Make sure the
nd that water is a finite resource, i.e.,
nnot import water from somewhere else
shortage at that place. A review of
hs should serve to emphasize that there
ater available at any location.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have attempted to construct the rainfall, population, and water use graphs.*
- *--have participated in the discussion and inferred the need for water conservation.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE D
ACTIVITY 5-19

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How many students had problems constructing the graphs? What problems did they have?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How many students had problems constructing the graphs? What problems did they have?

13. Do you feel that the students were able to relate population to water usage? Comment.

14. What ways were students able to suggest to keep from running out of water?

Side A

UNIT V, CORE D
ACTIVITY 5-19

Teacher ______________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

4. Realize the problems associated with the disposal of waste water.

5. Recognize the impact of water pollution.

6. Understand the broad problems of water management.

Core D Objectives for the Student:

2. Establish that water is a vulnerable resource.

4. Establish that, as population increases, impact on environment increases.

ENVIRONMENTAL THEME:

Ecological Trade-offs, Finiteness of Resources, Complementarity of Organisms and Environment

INQIURY SKILLS:

Inferring

PROBLEM-SOLVING SKILLS:

Identifying Controls

PRACTICAL APPLICATION:

Communication Skills, Realization that Sewage Is out of Place in Water

TIVITY

ls for the Student:
Realize the problems associated with the disposal of waste water.

Recognize the impact of water pollution.

Understand the broad problems of water management.

bjectives for the Student:
Establish that water is a vulnerable resource.

Establish that, as population increases, impact on environment increases.

THEME:
al Trade-offs, Finiteness of Resources,
ntarity of Organisms and Environment

S:
g

NG SKILLS:
ing Controls

LICATION:
ation Skills, Realization that Sewage
f Place in Water

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE D.	WATER MANAGEMENT
ACTIVITY 5-20.	A LITTLE GOES A LONG WAY

MATERIALS

Cup or beaker, 400 ml
Measure: 1 tablespoon
Microscopes, 4
Microscope slides, 4
Medicine droppers, 4
*Jars, 2 one-gallon, widemouthed
*Goldfish, 2
*Aquarium or pond water
*Dry pet food
*Small aquarium net

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-20. A Little Goes a Long Way

Domestic sewage places a severe burden on natural waters by introducing organic material subject to microbial action. The microbial activity in turn reduces the oxyg content available to aquatic life. This activity demonstrates the reduction of available oxygen due to the biological oxygen demand (BOD) of sewage.

Teacher Preparation:

1. This activity will be done in two days. The first day will be spent preparing the experiment, and the second day carrying it out.
2. Tap water may be substituted for aquarium or pond water if it is suitably conditioned. Water should be run forcibly from the tap into a large open container (basin) and allowed to stand for three or four days. This will allow the chlorine (added at the treatment plant) to dissipate into the air as vapor.

Day 1.

It will be necessary to prepare some artificial "sewage" This is easily accomplished by suspending a small amount of dry pet food (dog or hamster) in water. Use about on tablespoon of crushed dry pet food in one cup of aquariu

TEACHING STRATEGIES

A Little Goes a Long Way

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d (dog or hamster) in water. Use about one
crushed dry pet food in one cup of aquarium

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--participate in mixing the pet food solution and preparing the jars of aquarium water.*
- *--conclude that microbes are present in the mixture as well as in sewage.*
- *--observe that the fish in Jar 2 gulped air from the surface while the fish in Jar 1 swam in a normal fashion.*
- *--recognize Jar 1 as a control.*
- *--conclude that the microbes present in the sewage used up a lot of the air present in Jar 2.*
- *--conclude that what is desirable for one organism may be detrimental to another.*
- *--conclude that pollution is often simply something out of place.*
- *--conclude that sometimes a very small amount of pollution does a great deal of harm.*
- *--set up gallon jars of water.*

MATERIALS	TEACHING STRATEGIES

or pond water. Allow this to soak for awhile, then stir into a slurry. This is essentially a nutrient rich broth that has many of the chemical and physical properties of sewage without the obvious drawbacks.

When the sewage is prepared, fill two one-gallon jars about two-thirds full of aquarium or pond water. Label these 1 and 2.

Begin by saying:

> TOMORROW WE WILL DO AN EXPERIMENT TO SEE HOW FISH ARE AFFECTED BY SEWAGE DUMPED INTO THEIR ENVIRONMENT. TODAY WE MUST GET READY BY PREPARING SOME "MAKE-BELIEVE SEWAGE".

Select some students to prepare the "sewage" and others to prepare the jars of aquarium or pond water as directed above.

When the "sewage" and jars of water have been prepared, ask:

> WHAT WILL THE PET FOOD MIXTURE STAND FOR IN OUR EXPERIMENT?
>
> WHAT IS SEWAGE?
>
> COULD ANYTHING LIVE IN SEWAGE?
>
> COULD MICROBES BE LIVING IN OUR PET FOOD MIXTURE?
>
> WHAT WOULD THE MICROBES USE FOR FOOD IF THEY LIVED IN SEWAGE?

TEACHING STRATEGIES

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THE PET FOOD MIXTURE STAND FOR IN
MENT?

WAGE?

HING LIVE IN SEWAGE?

OBES BE LIVING IN OUR PET FOOD

THE MICROBES USE FOR FOOD IF THEY
EWAGE?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "Sewage."

--respond, "Wastes," "Icky stuff," "Leftovers," "Stuff from the toilet," and so forth.

--respond, "Yes, lots of microbes."

--respond, "Probably."

--recall the decomposition activities in Unit IV and respond, "All that stuff," "All the rotten food," "The wastes."

WHAT WOULD THEY USE FOR FOOD IN OUR PET FOOD MIXTURE?

DO YOU THINK THEY'D LIKE TO LIVE IN A PLACE LIKE THAT?

WHY WOULD IT BE A GOOD PLACE TO LIVE?

WHEN WE MIXED THE PET FOOD AND AQUARIUM WATER, WHERE DID THE MICROBES COME FROM?

Emphasize that the microbes were in the aquarium water an that the pet food is now food for the microbes. Guard against allowing the students to assume that microbes are in the pet food and that they feed their pets microbes.

Then direct the students to pour the "sewage" mixture into Jar 2. Stir the mixture thoroughly and set the jars aside overnight.

Day 2.

Discuss and describe with the students the appearance of both water jars, noticing the thickness of Jar 2, its similarity to real sewage, and so forth.

Allow students to examine a drop of the "sewage" mixture under the microscopes. Follow the procedures and cautions outlined in Core C for preparing a "wet" slide. Even though microorganisms will be present, they may or may not be able to see them. Tell students to watch very closely, for the microbes will dart in and out of view.

Encourage descriptions of what is seen, and if one student has a slide which shows many microorganisms, allow him to share his find with the other students.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
THEY USE FOR FOOD IN OUR PET FOOD	--respond, "The pet food."
NK THEY'D LIKE TO LIVE IN A PLACE	--indicate their opinions.
IT BE A GOOD PLACE TO LIVE?	--respond, "Because there's lots of food."
KED THE PET FOOD AND AQUARIUM WATER, HE MICROBES COME FROM?	--respond, "Microbes are everywhere," "From the aquarium water."
he microbes were in the aquarium water and d is now food for the microbes. Guard the students to assume that microbes ood and that they feed their pets	
students to pour the "sewage" mixture r the mixture thoroughly and set the ight.	--place the jars in an assigned spot for use during the next class period.
ribe with the students the appearance of noticing the thickness of Jar 2, its al sewage, and so forth.	
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MATERIALS

TEACHING STRATEGIES

INVOL
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Continue by saying:

> TODAY WE WILL CONDUCT OUR EXPERIMENT TO SEE HOW FISH ARE AFFECTED BY SEWAGE PUT INTO THEIR WATER.

Select students to transfer one goldfish from the aquarium or pond to each jar.

WAIT

While waiting for results, ask:

> WHY DID WE ADD NOTHING TO THE WATER IN JAR 1?

INVOL
SLOW
STUD

In a short time the fish in Jar 1 should be acclimated to its new surroundings. About the same time, the fish in Jar 2 should be noticeably stressed. It should be swimming near the surface and gulping for air.

TEACHING STRATEGIES

INVOLVE YOUR
SLOWEST
STUDENTS

:

CONDUCT OUR EXPERIMENT TO SEE HOW
CTED BY SEWAGE PUT INTO THEIR

transfer one goldfish from the aquarium
r.

WAITING TIME

results, ask:

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INVOLVE YOUR
SLOWEST
STUDENTS

e fish in Jar 1 should be acclimated
dings. About the same time, the fish
noticeably stressed. It should be
surface and gulping for air.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recall the importance and meaning of a control, and respond, "To see what happens without sewage," "To check our experiment," "To have something to compare Jar 2 with," "As a control."

MATERIALS

TEACHING STRATEGIES

Then ask:

> DO YOU NOTICE ANY DIFFERENCES IN THE BEHAVIOR OF OUR FISH?

After the observation has been made (Fish 2 gulping) return both fish to their home aquarium or pond. Don't stress the fish more than necessary!

> WHAT DID THE SEWAGE DO TO THE WATER IN JAR 2?
>
> WHY DID THE FISH COME TO THE TOP?
>
> WHERE DID ALL THE AIR IN JAR 2 GO? THE FISH IN JAR 1 HAD ENOUGH AIR.

If students do not recall that microbes use air and that they most likely depleted the oxygen supply in Jar 2, recall Activity 5-12, "Microbes in Water," by asking:

> WHAT DO MICROBES NEED TO LIVE?
>
> WERE MICROBES IN JAR 2?
>
> WHY WAS THERE LESS OXYGEN IN JAR 2 THAN IN JAR 1?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ICE ANY DIFFERENCES IN THE BEHAVIOR H?	--respond, "Yes," "Fish 1 is happy," "Fish 1 feels at home," "Fish 1 is O.K.," and so forth. --respond, "Yes," "Fish 2 is unhappy," "Fish 2 is gasping for breath," "Fish 2 is swimming on the surface," and so forth.
vation has been made (Fish 2 gulping) h to their home aquarium or pond. Don't more than necessary!	
HE SEWAGE DO TO THE WATER IN JAR 2?	--respond, "It made it hard for the fish to breathe," "It took away the air," "It removed the oxygen."
E FISH COME TO THE TOP?	--respond, "For air," "It couldn't breathe."
ALL THE AIR IN JAR 2 GO? THE FISH AD ENOUGH AIR.	--respond, "Sewage took the air away," "Microbes used it all up."
not recall that microbes use air and that depleted the oxygen supply in Jar 2, 5-12, "Microbes in Water," by asking:	
ROBES NEED TO LIVE?	--respond, "Air," "Food."
ES IN JAR 2?	--respond, "Yes."
RE LESS OXYGEN IN JAR 2 THAN IN	--respond, "The microbes used it up."

HAVE YOU INVOLVED ALL STUDENTS?

MATERIALS	TEACHING STRATEGIES

INVO
SLO
STU

Hold up the amount of pet food used and say:

> WE PUT IN ONLY A LITTLE BIT, BUT IT DID SO MUCH HARM. OUR PETS EAT THIS AND IT DOESN'T HURT THEM. WHY DID OUR FISH NOT LIKE IT?

DISCUSS

> WHAT WOULD HAPPEN, THEN, IF WE PUT A LITTLE BIT OF SEWAGE IN THE WATER?

> SEWAGE ISN'T SO BAD IF IT'S IN A TRUCK OR USED AS FERTILIZER.

Continue the discussion until it is established that sewage or pollution is something that doesn't belong in water and that it doesn't take much to do some harm. It might also be interesting to ask the students to relate the title of this activity to what was actually done.

TEACHING STRATEGIES

INVOLVE YOUR SLOWEST STUDENTS

unt of pet food used and say:

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OUR PETS EAT THIS AND IT DOESN'T
WHY DID OUR FISH NOT LIKE IT?

DISCUSSION TIME

HAPPEN, THEN, IF WE PUT A LITTLE BIT
IN THE WATER?

'T SO BAD IF IT'S IN A TRUCK OR USED
ZER.

cussion until it is established that
ion is something that doesn't belong
t it doesn't take much to do some harm.
interesting to ask the students to
of this activity to what was actually

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "The dog eats the food, the fish don't," "The hamster doesn't breathe the sewage," "The dog food doesn't belong in the water."

--infer that because it is not supposed to be in the water, it will do some harm.

ACTIVITY
5-20

MATERIALS

TEACHING STRATEGIES

CHANG

See Change of Pacer 19.

TEACHING STRATEGIES

er 19.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have observed that the fish in Jar 2 had difficulty getting air while the fish in Jar 1 did not.*
- *--have concluded that the fish did not get enough air because the sewage was in the water.*

CHANGE OF PACER

UNIT V, CORE D
ACTIVITY 5-20

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the students have any difficulty relating the pet food mixture to sewage?
☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes — Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

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If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the students have any difficulty relating the pet food mixture to sewage?
☐ Yes ☐ No

13. Do you feel that the students grasped the concept of microbes using up the oxygen?

UNIT V, CORE D
ACTIVITY 5-20

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Core D Objectives for the Student:

1. Establish that water is a limited resource.
2. Establish that water is a vulnerable resource.
3. Establish that, as population increases, demands upon resources increase.
4. Establish that, as population increases, impact on environment increases.

ENVIRONMENTAL THEME:

Complementarity of Organisms and Environment

INQUIRY SKILLS:

Applying Value Judging

PROBLEM-SOLVING SKILLS:

Knowing the Question, Knowing What Varies, Predicting Outcomes

PRACTICAL APPLICATION:

Expressing Values in Regard to Water Conservation, Oral Expression to Explain and Defend Their Choices

TIVITY

ls for the Student:

Understand the need for water.

Recognize the sources of water.

Realize the problems associated with the preparation of usable water.

Realize the problems associated with the disposal of waste water.

Recognize the impact of water pollution.

Understand the broad problems of water management.

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Establish that water is a limited resource.

Establish that water is a vulnerable resource.

Establish that, as population increases, demands upon resources increase.

Establish that, as population increases, impact on environment increases.

THEME:

ntarity of Organisms and Environment

S:

Value Judging

NG SKILLS:

the Question, Knowing What Varies,
ng Outcomes

LICATION:

ng Values in Regard to Water
tion, Oral Expression to Explain and
heir Choices

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE D.	WATER MANAGEMENT
ACTIVITY 5-21.	CLUES TO SUCCESS: UNDERSTANDING

ACTIVITY
5-21

MATERIALS

Worksheets 5-11A, B, C, D
(Water in the Environment)
Slides 5-35 through 5-38
*33 mm Slide projector

Slide 5-35, Worksheet 5-11

WATER IN THE
ENVIRONMENT

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-21. Clues to Success: Understanding

The Clues to Success booklet, Worksheet 5-11 (Water in the Environment)*, will help you assess student understanding of Part I of this unit. Besides concept assessment, it will indicate facility in reading a bar graph as well as some of the problem-solving skills related to successful use of the materials. Based on the results of this assessment, a review of previous activities and Change of Pacers should be made as necessary before continuing with Part II. The use of the assessment will help to reinforce in the student's mind a dichotomy between the two parts of this unit.*

Distribute Worksheet 5-11 (*Water in the Environment*) and have students write their names and the date in the space provided on the cover. Direct a student to read the booklet title and offer ideas on what it will be about.

Say:

> THE PURPOSE OF THIS BOOKLET IS TO HELP YOU SEE WHAT SOME OF THE THINGS ARE THAT YOU HAVE LEARNED ABOUT WATER. LOOK ONLY AT YOUR OWN BOOKLET AND WE WILL TALK ABOUT YOUR ANSWERS LATER. ARE THERE ANY QUESTIONS?

Read Question 1. Repeat the question, allowing students time to mark the answer.

TEACHING STRATEGIES

Clues to Success: Understanding

*cess booklet, Worksheet 5-11 (*Water in
, will help you assess student under-
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DISTRIBUTE MATERIALS

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OF THIS BOOKLET IS TO HELP YOU
ME OF THE THINGS ARE THAT YOU HAVE
UT WATER. LOOK ONLY AT YOUR OWN
WE WILL TALK ABOUT YOUR ANSWERS
THERE ANY QUESTIONS?

Repeat the question, allowing students
answer.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

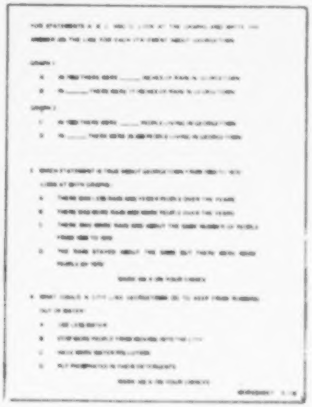
- -*complete Worksheets 5-11A, B, C, D.*
- -*discuss the questions and choices in the booklet.*

Students should:

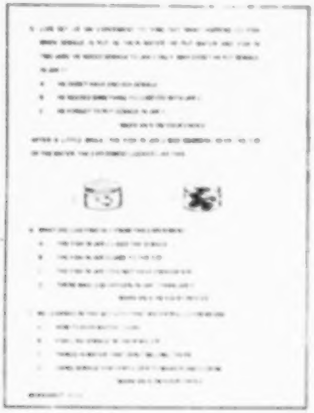
--mark Choice A of Question 1.

MATERIALS

Slide 5-36, Worksheet 5-11B



Slide 5-37, Worksheet 5-11C



TEACHING STRATEGIES

Read the introductory statements for Question 2, including the labels on the graphs, allowing plenty of time for the students to look at the graphs. Read and repeat each part to this question. Caution students to write their answers in the right place.

When all have written their answers, read Question 3 twice. Read it slowly and repeat as necessary.

GIVE S
TIME
TO
THINK

Read and repeat the question and statements for Question 4.

When all students have responded, have them turn the page and look at Question 5. Read each question on this page twice, allowing time for all to respond.

Now direct attention to Item 8 on the next page.

Read and repeat the introduction to Question 8. Be sure the students understand the directions before reading the groups of statements.

TEACHING STRATEGIES

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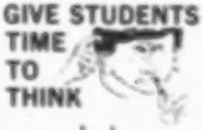

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understand the directions before
s of statements.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark each part of Question 2 as follows:
Graph 1. A. 15 B. 1960
Graph 2. C. 20,000 D. 1970

--mark an X on Option D of Question 3.

--mark an X on Options A and/or B of Question 4.

--mark an X on Option B of Question 5.
--mark an X on Option B and/or C of Question 6.
--mark an X on Option C of Question 7.

ACTIVITY
5-21

MATERIALS

Slide 5-38, Worksheet 5-11D

TEACHING STRATEGIES

Then read each group of statements twice, allowing plent
of time to respond.

When students have finished, collect the booklets. Then
project Slides 5-35 through 5-38 of the booklet on the chalkboard and review students' responses. Have the students explain and discuss the choices they marked as well as why they did not mark other choices. When possible, have the students clear up misunderstandings for other students.

After class, complete Tallysheet 5-5 and send a copy of it to BSCS. Instructions for scoring the worksheet appear on the tallysheet. Review students' success with these items and summarize the results in the Student Record of Progress as outlined below.

Guidelines for Interpretation and Recording

Rating of Involvement: On the page titled "Responsibilit
and Involvement" in the Participation Section of the Student Record of Progress are guidelines to rate each student's involvement and interest in science to date. For students who are rated low, explore the suggestions in the Introduction to the Student Record of Progress.

NOTE: Items will be recorded in the Student Record of Progress in the order in which they appear on Tallysheet 5-5. Check to be sure that you have recorded responses in the proper columns.

Question 2 was designed as a clue to the measurement skills of students as they relate to the use of graphs. Two dimensions of using a graph were measured. One

TEACHING STRATEGIES

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pond.

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nts as they relate to the use of graphs.
of using a graph were measured. One

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark an X on Option B of Question 8.
--mark an X on Option A of Question 9.
--mark an X on Option A of Question 10.
--mark an X on Option B of Question 11.

--explain and defend answers; recall previous classroom experiences.

MATERIALS

TEACHING STRATEGIES

(Items A and C) was the student's ability to locate a date on one axis and record the corresponding number. The other (Items B and D) was the student's ability to locate a given number on one axis and record the corresponding date.

On the numbers page in the Student Record of Progress, find the columns headed "Act. 5-21. Using A Graph." In the first column titled "Number" circle YES if the student answered both A and C correctly. Circle NO if the student answered either or both incorrectly or failed to respond to either or both questions.

In the second column titled "Date" circle YES if the student answered both B and D correctly. Circle NO if the student answered either or both incorrectly or failed to respond to either or both questions.

Question 1 was designed to assess the problem-solving ability of knowing the question to be answered in an experiment. Students experiencing difficulty in problem-solving will have greater difficulty with the materials and need many experiences for increasing this aspect of their development.

On the "Problem-Solving Page" of the Student Record of Progress find the column titled "Knowing Question." Circle YES if the student marked the correct response to Item 1. Circle NO if the student marked an incorrect response or failed to respond to the question.

Questions 3 and 5 were designed to assess the problem-solving ability of knowing what varies in a problem. On the "Problem-Solving Page" of the Student Record of Progress find the title titled "What Varies." Circle YES if the student marked the correct responses for both Questions 3 and 5. Circle NO if the student marked an incorrect response for either or both questions, or if the student failed to respond to either or both questions.

TEACHING STRATEGIES

as the student's ability to locate a and record the corresponding number. B and D) was the student's ability to mber on one axis and record the e.

ge in the Student Record of Progress, headed "Act. 5-21. Using A Graph." mn titled "Number" circle YES if the both A and C correctly. Circle NO if red either or both incorrectly or failed her or both questions.

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ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Questions 4 and 6 were designed to assess the problem-solving ability of predicting outcomes. On the "Problem Solving Page" of the Student Record of Progress find the column titled "Outcomes." Circle HIGH if the student marked all four possible correct responses and no incorrect responses. Circle SOME if the student marked two or three correct responses, no incorrect responses, and did not omit either question. Circle LOW if the student marked any incorrect responses or omitted either question.

Now review the three problem-solving skills summarized i the Student Record of Progress and note which students lack these skills. Low rankings should not concern you and high marks should be very reassuring. The rankings for this section, like all others in the Student Record of Progress, are not used to grade or pass judgments on students. Their only purpose is to establish baselines from which to proceed in your continuing effort to aid the intellectual development of students. If a student lacks problem-solving skills, he must not be expected to hypothesize, think abstractly, or generalize well. He should be helped in focusing his thinking on concrete objects. Any progress in concrete reasoning is success for you and him.

Question 7 assesses the students' understanding of the column marked 5-21, Pollution. Circle YES if the studen marked the correct answer.

Questions 8-11 were designed to assess the students' understanding of the concept "Water Conservation." Circl HIGH if the student marked correct responses for all fou questions. Circle SOME if the student marked correct responses for three of the questions. Circle LOW if the student marked correct responses for less than three questions.

TEACHING STRATEGIES

d 6 were designed to assess the problem-
y of predicting outcomes. On the "Problem-
of the Student Record of Progress find the
"Outcomes." Circle HIGH if the student
r possible correct responses and no
onses. Circle SOME if the student marked
orrect responses, no incorrect responses,
it either question. Circle LOW if the
any incorrect responses or omitted either

three problem-solving skills summarized in
cord of Progress and note which students
lls. Low rankings should not concern you
should be very reassuring. The rankings
on, like all others in the Student Record
e not used to grade or pass judgments on
r only purpose is to establish baselines
proceed in your continuing effort to aid
l development of students. If a student
olving skills, he must not be expected to
ink abstractly, or generalize well. He
d in focusing his thinking on concrete
progress in concrete reasoning is success
.

sses the students' understanding of the
-21, Pollution. Circle YES if the student
ect answer.

were designed to assess the students'
f the concept "Water Conservation." Circle
dent marked correct responses for all four
cle SOME if the student marked correct
hree of the questions. Circle LOW if the
correct responses for less than three

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES

EACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, __each__ __student__ should, as a minimum:

--have completed Worksheets 5-11A, B, C, D.
--have discussed the questions and choices in the booklet.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE D
ACTIVITY 5-21

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How do you feel about the spacing of the Clues to Success?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How do you feel about the spacing of the Clues to Success?

13. How would you change this clue to success to make the results more helpful to you?

14. Complete and send Tallysheet 5-5 to BSCS.

UNIT V, CORE D
ACTIVITY 5-21

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMR Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

UNIT V
REACTIONS TO CORE D

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core? ☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

BSCS Evaluation: EHH Feedback Fo

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

Side A

NEW STUDENTS ENTERING DURING THIS C

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Te
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-American
O = other

W=Wi
B=Bi
O=Ot
(N

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

oup	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				

h-
ian

W=WISC
B=Binet
O=Other
(Name)

n for Dropping

Me and my·
Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE E. COMPONENTS OF AIR

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

The two parts of this unit wi
air and water as major components
Part 1 emphasizes the importa
environment by helping the student

1. Understand the need for water
2. Recognize the sources of wate
3. Realize the problems associat
4. Realize the problems associat
5. Recognize the impact of water
6. Understand the broad problems

Part 2 emphasizes the nature
by helping the student to:

7. Understand the composition of
8. Realize that the quality of a
9. Realize that substances are c
10. Comprehend the impact of air

C

1. Establish the need for air.
2. Identify oxygen and carbon di
3. Relate the cycling of oxygen

IT V. AIR AND WATER IN MY ENVIRONMENT

RE E. COMPONENTS OF AIR

BSCS

UNIT V GOALS

The two parts of this unit will serve to develop an appreciation of the roles of air and water as major components of our environment.

Part 1 emphasizes the importance of water as a vulnerable component of our environment by helping the student to:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Part 2 emphasizes the nature of air as a complex component of our environment by helping the student to:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

CORE E OBJECTIVES

1. Establish the need for air.
2. Identify oxygen and carbon dioxide as components of air.
3. Relate the cycling of oxygen and carbon dioxide to life processes.

CORE E RATIONALE

As is the case with water, air is an environmental resource that has critical importance to everyone's daily life. Most living things need a plentiful supply of fresh air for survival. In this core, the students will have the opportunity to identify the components of air that are of direct importance to them and other living things. They will also examine the cyclic nature of these components within the environment.

BAC

This core introd
5-22 forms a transiti
points are emphasized
nature of that source,
concepts are reinforc

Activity 5-23 in
This is done through
extinguished when it
oxygen is compared to

In Activity 5-24
air. In this case, e
balloon is emptied in
in the jar (because o
during the filling of
times in order to inc

Activity 5-25 de
In both cases, air is
chamber (water pipe).
from blue to yellow w
blue will turn from c
these indicators are
splashing. These are

Activity 5-26 uti
of oxygen and carbon
strate the production
carbon dioxide by an
demonstrates the util
produced by the plant

Me and my Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE E. COMPONENTS OF AIR

CORE E RATIONALE

As is the case with water, air is an environmental resource that has critical importance to everyone's daily life. Most living things need a plentiful supply of fresh air for survival. In this core, the students will have the opportunity to identify the components of air that are of direct importance to them and other living things. They will also examine the cyclic nature of these components within the environment.

BACK

This core introdu
5-22 forms a transitic
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nature of that source,
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Activity 5-23 int
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In Activity 5-24
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Activity 5-25 dem
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these indicators are t
splashing. These are

Activity 5-26 uti
of oxygen and carbon d
strate the production
carbon dioxide by an a
demonstrates the utili
produced by the plant

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE E. COMPONENTS OF AIR

BSCS

BACKGROUND INFORMATION FOR THE TEACHER

This core introduces air as an important environmental resource. Activity 5-22 forms a transition from the study of water to air. As before, four points are emphasized: our need for air, our source of air, the limited nature of that source, and our ability to pollute that resource. These concepts are reinforced and expanded in subsequent cores.

Activity 5-23 introduces oxygen as an essential natural component of air. This is done through a straightforward experiment in which a candle flame is extinguished when it consumes the oxygen in a closed jar. The candle's use of oxygen is compared to that of our own body.

In Activity 5-24 carbon dioxide is established as a natural component of air. In this case, exhaled breath is captured in a balloon. The air from the balloon is emptied into a jar. A lit candle is extinguished when it is placed in the jar (because of the accumulated carbon dioxide). It is important that, during the filling of the balloon, the same air is exhaled and inhaled several times in order to increase the amount of carbon dioxide.

Activity 5-25 demonstrates laboratory tests for carbon dioxide and oxygen. In both cases, air is bubbled through an indicator solution in a confined test chamber (water pipe). Bromthymol blue is an indicator solution that will turn from blue to yellow with increased carbon dioxide. Decolorized methylene blue will turn from colorless to blue with the addition of oxygen. Even though these indicators are totally safe, caution should be exercised to avoid excessive splashing. These are colored dye solutions.

Activity 5-26 utilizes the tests established above to detect the production of oxygen and carbon dioxide by other organisms. An experiment will demonstrate the production of oxygen by a plant (elodea) and the production of carbon dioxide by an animal (snail). A combined experiment (snail and plant) demonstrates the utilization of the snails carbon dioxide by the plant. Oxygen produced by the plant will be utilized by the snail.

Me and my·
Environment

UNIT V
CORE E

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in t*
be prepared several days or weeks in advance. Use t
a teaching and preparation schedule. All supplies n

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed: Materials You Furnish	Check List of Supplies Needed: Materials in Supply Kit	(*Italics*
5-22. The Air We Breathe	35 mm Slide projector		
	#3 Can, empty		Remove the
Days needed: 1	8 1/2 X 11 inch Paper		Two or thre
	Small rubber bands		Four or five
	Cover for can		To extinguis
		Slide 5-39	Fireman
		Slide 5-40	Scuba diver
		Slide 5-41	Astronaut
		Slides 5-42, 5-43	Industrial
		Slides 5-44, 5-45	City Streets
		Slides 5-46, 5-47	Agricultural
		Slides 5-48, 5-49	Smokers
		Chart 5-1	Water
		Chart 5-3	Air
5-23. Oxygen Is a Part of Air	Balloons		One per stud
	Birthday candles		One half by
Days needed: 1	32-ounce glass jar with screw lid		*One, such as orange dri*
	Matches		
	Clock with second hand		
	Cardboard or heavy paper		To attach to
		Crucible tongs	To lower can

PLANNING GUIDE

ties (*indicated in italics and an* ➤ *in the margin*) must several days or weeks in advance. Use this summary as and preparation schedule. All supplies needed are listed.

BSCS

pplies Needed	Notes and Suggestions to Teacher *(Italics and Arrow Indicate Advance Preparation Directions)*
Materials in Supply Kit	
	Remove the paper covering
	Two or three pieces
	Four or five
	To extinguish fire
lide 5-39	Fireman
lide 5-40	Scuba diver
lide 5-41	Astronaut
lides 5-42, 5-43	Industrial Scenes
lides 5-44, 5-45	City Streets
lides 5-46, 5-47	Agricultural Area
lides 5-48, 5-49	Smokers
hart 5-1	Water
hart 5-3	Air
	One per student
	One half by three inches
	One, such as coffee creamer, instant tea or coffee, powdered orange drink
	To attach to candle
ucible tongs	To lower candle into jar

Me and my·
Environment

UNIT V
CORE E

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ be prepared several days or weeks in advance. U a teaching and preparation schedule. All suppli

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	*(Ita*
5-24. Carbon Dioxide Is a Part of Air	Balloon		One
	Rubber band, medium size		One
	Glass jars		*Two tal*
Days needed: 1	Birthday candles		
	Cardboard or heavy paper		To attac
		Vinyl tubing, 1/16-inch wall, 1/4-inch inside diameter	About 12
		Worksheet 5-12	Pad of 2
		Crucible tongs	To lower
5-25. Testing for Carbon Dioxide and Oxygen	Balloon		One per
	Rubber band, medium size		One per
	32-ounce Tall glass jar		One per
	Sink or bucket		
Days needed: 1	Water		For rins
	Toothpicks		One or t
	Spoon		One larg
		Water pipe test chamber	One per
		Vinyl tubing, 1/4-inch diameter	About tw
		Oxygen test solution	*One drop* *mixing*
		Carbon dioxide test solution	One drop
		Mityvac hand pump	One per
		Sodium hydrosulfite	For deco

PLANNING GUIDE

BSCS

ivities (*indicated in italics and an* ◀ *in the margin*) must
red several days or weeks in advance. Use this summary as
ng and preparation schedule. All supplies needed are listed.

Supplies Needed	
Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	One
	One
	Two tall jars, preferably of a similar size
	To attach to the candles
Vinyl tubing, 1/16-inch wall, 1/4-inch inside diameter	About 12 inches long
Worksheet 5-12	Pad of 20; one worksheet per student
Crucible tongs	To lower candle into jar
	One per pair of students
	One per pair of students
	One per pair of students
	For rinsing water pipes
	One or two
	One large spoon for stirring
Water pipe test chamber	One per pair of students
Vinyl tubing, 1/4-inch diameter	About two feet for each pair of students
Oxygen test solution	*One dropping bottle per pair of students (see instructions for mixing in Activity 5-25).*
Carbon dioxide test solution	One dropping bottle per pair of students
Mityvac hand pump	One per pair of students
Sodium hydrosulfite	For decolorizing oxygen test solution

Me and my· Environment

UNIT V
CORE E

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in t*
be prepared several days or weeks in advance. Use t
a teaching and preparation schedule. All supplies n

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics*
5-26. Natural Sources of Oxygen and Carbon Dioxide Days needed: 3	Elodea (Anacharis)		Two sprigs
	Small water snails		Two per grou
	Pond or aquarium water		One-half gal
	Desk lamp		With 100-wa
	35 mm Slide projector		
	Tape recorder (optional)		
		Test tubes, 150 X 18 mm	Four per gr
		Rubber stoppers, solid #2	Four per gr
		Test tube rack	One per grou
		Bromthymol blue solution	In dropping
		Methylene blue solution, decolored	In dropping
		Worksheet 5-13	Clue to Succ
		Slide 5-50	Elodea exper
		Tallysheet 5-6	

PLANNING GUIDE

ies (*indicated in italics and an* ➤ *in the margin*) must
several days or weeks in advance. Use this summary as
nd preparation schedule. All supplies needed are listed.

BSCS

plies Needed Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Two sprigs per group of students
	Two per group of students
	One-half gallon
	With 100-watt bulb
est tubes, 150 X 18 mm	Four per group of students
ubber stoppers, solid #2	Four per group of students
est tube rack	One per group of students
romthymol blue solution	In dropping bottles, one per group of students
ethylene blue solution, decolored	In dropping bottles, one per group of students
orksheet 5-13	Clue to Success
lide 5-50	Elodea experiment
llysheet 5-6	

BSCS

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

Core E Objectives for the Student:

1. Establish the need for air.

ENVIRONMENTAL THEME:

Ecological Trade-offs, Finiteness of Resources

INQUIRY SKILLS:

Associating

PROBLEM-SOLVING SKILLS:

Drawing Conclusions

PRACTICAL APPLICATION:

Observation Skills; Discussion Skills; Realization That It Is Harmful To Breathe Bad Air

Activity 5-22. The Air We Breathe

This activity will provide a subject-matter transition from water to air by relating the four main themes used in the water section (needs, sources, finiteness, and pollution) to air. Through this activity the student will also recognize that some components of air are natural and others are man-made.

TIVITY

als for the Student:
Realize that the quality of air is
variable.

Realize that substances are
continually added to air.

Comprehend the impact of air
pollution on our environment.

Objectives for the Student:
Establish the need for air.

L THEME:
cal Trade-offs, Finiteness of Resources

LS:
ting

ING SKILLS:
Conclusions

PLICATION:
ion Skills; Discussion Skills;
ion That It Is Harmful To Breathe

e Air We Breathe

provide a subject-matter transition
by relating the four main themes used
on (needs, sources, finiteness, and
Through this activity the student
e that some components of air are
are man-made.

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE E.	COMPONENTS OF AIR
ACTIVITY 5-22.	THE AIR WE BREATHE

During this activity, each student should:

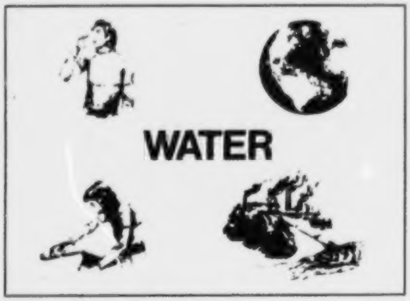
--observe Chart 5-1 and describe each water theme.
--observe Charts 5-1 and 5-3 and describe each way air is like water.

ACTIVITY
5-22

MATERIALS

Chart 5-1
Chart 5-3
Slides 5-39 through 5-49
*35 mm Slide projector
*No. 3 Can
*8 1/2 X 11 Paper, 2 pieces
*Small rubber bands, 4 or 5
*Cover for can to extinguish fire

Chart 5-1



*Not furnished in materials kit

TEACHING STRATEGIES

Begin this activity by displaying Chart 5-1 (Water Chart and saying:

> FOR SEVERAL WEEKS WE HAVE DISCUSSED MANY THINGS ABOUT WATER. THIS CHART REMINDS US OF WHAT WE TALKED ABOUT.

Point to each area of the chart and ask students what it suggests to them.

Then say:

> FOR THE NEXT SEVERAL WEEKS WE WILL BE DISCUSSING AIR AND DOING VARIOUS THINGS WITH IT. AIR IS LIKE WATER IN MANY WAYS. BY LOOKING AT THE FIRST PICTURE ON THE CHART, CAN YOU THINK OF ONE WAY AIR IS LIKE WATER?
>
> WE NEED AIR JUST AS MUCH AS WE NEED WATER. WE COULDN'T LIVE LONG IF WE DIDN'T HAVE BOTH OF THEM.

TEACHING STRATEGIES

vity by displaying Chart 5-1 (Water Chart)

L WEEKS WE HAVE DISCUSSED MANY THINGS
R. THIS CHART REMINDS US OF WHAT WE
UT.

rea of the chart and ask students what it
n.

T SEVERAL WEEKS WE WILL BE DISCUSSING
NG VARIOUS THINGS WITH IT. AIR IS LIKE
NY WAYS. BY LOOKING AT THE FIRST
THE CHART, CAN YOU THINK OF ONE WAY
WATER?

JUST AS MUCH AS WE NEED WATER. WE
VE LONG IF WE DIDN'T HAVE BOTH OF THEM.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--observe Slides 5-39, 5-40, and 5-41 and describe each man as wearing a mask because his air is undesirable.*
- *--observe the burning rubber band and paper demonstration.*
- *--observe Slides 5-42 through 5-49 and describe what is different in each picture.*
- *--realize that man helps to make parts of the air dirty.*

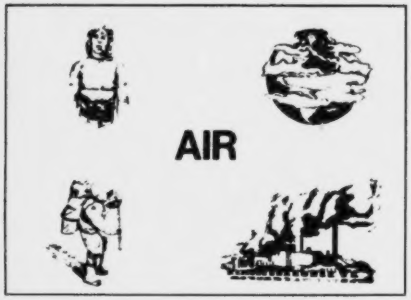
Students should:

--recall the activities in Cores A, B, C, and D of this Unit and indicate that the person suggests the need for water; the earth suggests that is where we get water; the dripping faucet suggests water's finiteness; and the factory suggests our pollution of water.

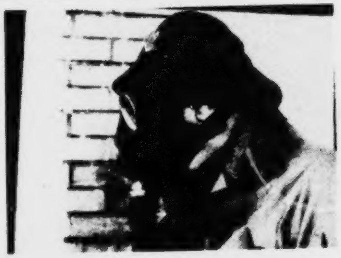
--infer from the first picture, which suggests that we need water, that we also need air.

MATERIALS

Chart 5-3



Slide 5-39



TEACHING STRATEGIES

WHAT DOES THE SECOND PICTURE TELL YOU ABOUT THE WAY WATER AND AIR ARE ALIKE?

Continue in a similar manner with the third and fourth pictures until students indicate their understanding that we need air, that it comes from our environment, we can run out of it, and that we can pollute it.

Now display Chart 5-3 (Air Chart) and say:

WHAT DO YOU THINK THIS CHART SHOWS US?

HERE IS A CHART REMINDING US HOW IMPORTANT AIR IS. IT IS VERY SIMILAR TO THE WATER CHART.

Discuss each picture on the chart and how it is similar to the water chart.

FROM LOOKING AT THIS CHART, WHAT DO YOU THINK WE WILL BE LEARNING ABOUT AIR?

Begin by projecting Slide 5-39 and ask:

WHAT DO YOU SEE IN THIS PICTURE?

WHY IS THE FIREMAN WEARING A MASK?

GIVE SE
STUDENTS
TO RES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HE SECOND PICTURE TELL YOU ABOUT THE ND AIR ARE ALIKE?	--infer from the second picture which suggests that water comes from our environment, that air does also.
milar manner with the third and fourth tudents indicate their understanding , that it comes from our environment, f it, and that we can pollute it.	--observe Pictures 3 and 4 on Chart 5-1 and relate them to the finiteness of air and to man's pollution of air.
t 5-3 (Air Chart) and say:	
THINK THIS CHART SHOWS US?	--observe Chart 5-3 and conclude that it shows us the importance of air.
ART REMINDING US HOW IMPORTANT AIR ERY SIMILAR TO THE WATER CHART.	
ure on the chart and how it is ter chart.	
AT THIS CHART, WHAT DO YOU THINK EARNING ABOUT AIR?	--respond, "We need air," "We get it from our environment," "We can run out of it," "We can pollute it."
ng Slide 5-39 and ask:	
SEE IN THIS PICTURE?	--respond, "A fireman wearing a mask while fighting a fire."
IREMAN WEARING A MASK?	--infer that the fireman is wearing a mask because the air is undesirable.

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

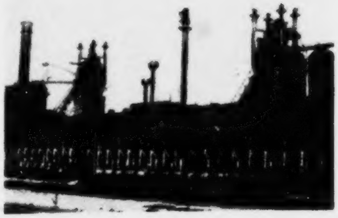
ACTIVITY
5-22

MATERIALS

Slide 5-40

Slide 5-41

Slide 5-42



TEACHING STRATEGIES

Project Slide 5-40 and ask:

WHAT DO YOU SEE IN THIS PICTURE?

WHY IS THE MAN WEARING A MASK?

Show Slide 5-41 and ask:

WHAT DO YOU SEE IN THIS PICTURE?

WHY IS THE MAN WEARING A MASK?

WHAT KIND OF AIR DO YOU THINK IS AROUND ALL OF THESE PEOPLE?

WHY ARE THEY WEARING MASKS?

CAN WE BREATHE SMOKY AIR, SMALL AMOUNTS OF AIR, OR NO AIR AT ALL AND STILL LIVE?

DOES OUR CLASSROOM HAVE THE KIND OF AIR WE WANT TO BREATHE?

Before proceeding with the following demonstration, chec your school rules to make sure a burning demonstration such as this is allowed. Close the windows and doors. Crumple some paper and place it in the No. 3 can. Light the paper and add the rubber bands. This will cause a great deal of smoke and a pungent odor. Have students observe the burning for a couple of minutes. Then cover the can to put out the fire, open the windows and ask:

WHAT IS IN THE AIR WE ARE BREATHING?

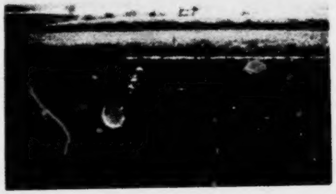
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
5-40 and ask:	
OU SEE IN THIS PICTURE?	--respond, "A diver wearing an air tank."
E MAN WEARING A MASK?	--infer that the diver is wearing the tank and mask because air is unavailable.
1 and ask:	
OU SEE IN THIS PICTURE?	--respond, "A spaceman," "An astronaut."
E MAN WEARING A MASK?	--infer that the astronaut is wearing a mask because air is unavailable.
OF AIR DO YOU THINK IS AROUND ALL OF PLE?	--conclude that the air is bad, or that none is available.
HEY WEARING MASKS?	--infer that masks are being worn to keep out the undesirable air, or to provide air.
EATHE SMOKY AIR, SMALL AMOUNTS OF AIR, AT ALL AND STILL LIVE?	--indicate, "Maybe," "Don't know."
LASSROOM HAVE THE KIND OF AIR WE WANT ?	--state that the classroom contains the kind of air they want to breathe.
ng with the following demonstration, check es to make sure a burning demonstration allowed. Close the windows and doors. per and place it in the No. 3 can. Light dd the rubber bands. This will cause a moke and a pungent odor. Have students ning for a couple of minutes. Then cover out the fire, open the windows and ask:	
THE AIR WE ARE BREATHING?	--state, "Smoke," "Dirt," "Paper," "Soot."

ACTIVITY
5-22

MATERIALS

Slide 5-46

Slide 5-47



Slide 5-48

TEACHING STRATEGIES

See Change of Pacers 20 and 21.

Slide 5-49

TEACHING STRATEGIES

acers 20 and 21.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have observed Charts 5-1 and 5-3 and listed at least two ways that water is similar to air.*
- *--have observed Slides 5-39 through 5-41 and described the men as wearing a mask to help them breathe.*
- *--have observed the burning demonstration.*
- *--have observed Slides 5-42 through 5-49 and indicated that in each case man has done something to the air.*

CHANGE OF PACER

MATERIALS	TEACHING STRATEGIES
Slide 5-43 	WHAT KIND OF AIR WOULD YOU PREFER TO BREATHE -- GOOD CLEAN AIR OR BAD DIRTY AIR? WHAT MADE OUR AIR DIRTY AND BAD? WHAT WAS BAD ABOUT THE AIR AROUND THE FIREMAN? WHAT WAS BAD ABOUT THE AIR AROUND THE SCUBA DIVER?
Slide 5-44 	WHAT WAS BAD ABOUT THE AIR AROUND THE ASTRONAUT? DOES MAN HELP MAKE PARTS OF THE AIR? HOW? Project Slides 5-42 through 5-49 of the before-and-after scenes. Discuss each by asking: WHAT KIND OF AIR DO YOU SEE?
Slide 5-45 	HOW WAS THE AIR CHANGED IN EACH PICTURE? Conclude this activity by saying: WHAT CAUSED THE AIR IN THESE PICTURES TO GET DIRTY?

EACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
AIR WOULD YOU PREFER TO BREATHE -- R OR BAD DIRTY AIR?	--state a preference for good clean air.
AIR DIRTY AND BAD?	--indicate, "The fire," "The teacher."
ABOUT THE AIR AROUND THE FIREMAN?	--respond, "It was too hot," "It was smoky."
ABOUT THE AIR AROUND THE SCUBA	--respond, "There was water in it," "There wasn't any."
BOUT THE AIR AROUND THE ASTRONAUT?	--respond, "There wasn't any," "There wasn't enough."
MAKE PARTS OF THE AIR?	--respond, "Yes."
	--respond, "Burning stuff," "From driving cars," and so forth.
through 5-49 of the before-and-after ch by asking:	
IR DO YOU SEE?	--observe the slides and state, "Clean air," "Dirty air."
R CHANGED IN EACH PICTURE?	--observe that the air became dirty, smoky, and smoggy. Infer that man and his machines caused the changes.
ity by saying:	
AIR IN THESE PICTURES TO GET	--conclude that man and his machines caused the air to get dirty.

UNIT V, CORE E
ACTIVITY 5-22 **Teacher** ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the students able to draw the analogy between water and air?
☐ Yes ☐ No

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the students able to draw the analogy between water and air?
☐ Yes ☐ No

13. Was the chart helpful in the discussion of the importance of air? ☐ Yes ☐ No
Comment.

14. Were students able to infer air conditions from the pictures of the men wearing masks? ☐ Yes ☐ No

UNIT V, CORE E
ACTIVITY 5-22

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air.

8. Realize that the quality of air is variable.

Core E Objectives for the Student:

1. Establish the need for air.

2. Identify oxygen and carbon dioxide as components of air

ENVIRONMENTAL THEME:

Cyclic Nature of Processes

INQUIRY SKILLS:

Inferring

PROBLEM-SOLVING SKILLS:

Interpreting Results

PRACTICAL APPLICATION:

How To Extinguish a Fire, Hazards of Playing in Refrigerators, Hazards of Playing with Plastic Bags, Identification of Oxygen, Increased Vocabulary

Activity 5-23. Oxygen is a Part of Air

This activity is designed to relate air to breathing and to identify oxygen as a component of air that is necessary for life. This is accomplished through a series of activities designed for both individual and team work and through a demonstration by the teacher.

TIVITY

als for the Student:
Understand the composition of air.

Realize that the quality of air is variable.

Objectives for the Student:
Establish the need for air.

Identify oxygen and carbon dioxide as components of air

L THEME:
Nature of Processes

LS:
ng

ING SKILLS:
eting Results

PLICATION:
Extinguish a Fire, Hazards of Playing
igerators, Hazards of Playing with
Bags, Identification of Oxygen,
ed Vocabulary

ygen is a Part of Air

lesigned to relate air to breathing and
as a component of air that is necessary
accomplished through a series of
d for both individual and team work
nstration by the teacher.

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE E.	COMPONENTS OF AIR
ACTIVITY 5-23.	OXYGEN IS A PART OF AIR

During this activity, each student should:

--breathe in and out of a balloon.
--observe an increase and a decrease in the size of the balloon.
--observe the movements another person's chest makes while that person is breathing.

ACTIVITY
5-23

MATERIALS

Crucible tongs
*Balloons, 1 per student
*Candle, 1/2 X 3 inches
*Matches
*Glass jar with screw cap
*Cardboard disc, 2-inch diameter

*Not furnished in materials kit

TEACHING STRATEGIES

Distribute the balloons and direct the students to work in pairs. You might prefer to suggest male-male and female-female partners for this specific activity.

Begin by saying:

WHAT IS THE AIR?

AC
A

LET'S DO SOME THINGS THAT MIGHT HELP US ANSWER THIS QUESTION.

Distribute a balloon to each student.

DISTRIB

BREATHE INTO THE BALLOON AND THEN PINCH THE BALLOON TIGHTLY CLOSED.

WHAT IS IN THE BALLOON?

TEACHING STRATEGIES

balloons and direct the students to work
might prefer to suggest male-male and
partners for this specific activity.

g:

HE AIR?

ACCEPT ALL ANSWERS

OME THINGS THAT MIGHT HELP US ANSWER
ION.

lloon to each student.

DISTRIBUTE MATERIALS

TO THE BALLOON AND THEN PINCH
N TIGHTLY CLOSED.

THE BALLOON?

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--be able to use properly the terms "inhale" and "exhale".*
- *--observe the extinction of a candle deprived of air.*
- *--infer that the candle flame went out because it ran out of oxygen.*
- *--identify oxygen as an important part of the air.*
- *--identify the lack of oxygen as the reason the flame was extinguished.*

Students should:

--speculate on the makeup of the air.

--respond, "Air is in the balloon," "My breath."

MATERIALS

TEACHING STRATEGIES

BLOW INTO THE BALLOON AND THEN DRAW THE AIR OUT AGAIN WITHOUT REMOVING YOUR MOUTH FROM THE BALLOON. WHAT HAPPENS?

NOW TAKE TURNS AND WATCH YOUR PARTNER'S CHEST AS HE BREATHES.

Have each student locate his rib cage, place his hands on it, take a deep breath, and describe the movement and size increase.

Then ask:

WHAT HAPPENS TO YOUR CHEST AS YOU BREATHE?

WHAT HAPPENS TO THE BALLOON WHEN YOU BREATHE IN AND OUT?

Introduce the words "inhale" and "exhale" at this time. Write the two words on the chalkboard. Help the students realize that as their chests get bigger, the balloons get smaller, and vice versa because the air from the balloons goes into their chests.

Then ask:

WAS YOUR CHEST SIZE BIGGER WHEN YOU INHALED OR WHEN YOU EXHALED?

WHY WAS YOUR CHEST BIGGER WHEN YOU INHALED?

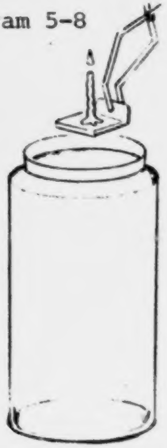
WHAT DO YOU THINK IS IN YOUR INHALED AIR?

EACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
BALLOON AND THEN DRAW THE WITHOUT REMOVING YOUR MOUTH OON. WHAT HAPPENS?	--observe and respond that the balloon increases and then decreases in size.
S AND WATCH YOUR PARTNER'S CHEST S.	--observe their partner's chest movements as their partners breathe.
locate his rib cage, place his hands on eath, and describe the movement and	--feel and describe the upward and outward movement of their rib cages during breathing.
TO YOUR CHEST AS YOU BREATHE?	--respond, "Gets bigger and smaller."
TO THE BALLOON WHEN YOU BREATHE	--respond, "Gets bigger and smaller."
s "inhale" and "exhale" at this time. s on the chalkboard. Help the students ir chests get bigger, the balloons get versa because the air from the balloons sts.	
SIZE BIGGER WHEN YOU INHALED OR ED?	--state, "Bigger when I inhaled."
HEST BIGGER WHEN YOU INHALED?	--infer that they had air in their chests.
INK IS IN YOUR INHALED AIR?	--state, "Air," "I don't know," "Dirt," and so on.

ACTIVITY
5-23

MATERIALS

Diagram 5-8



TEACHING STRATEGIES

Set up the following demonstration to illustrate that oxygen is one key component of inhaled air.

Support a candle on a piece of cardboard or heavy paper by putting a few drops of melted wax on the paper and holding the candle on it as it hardens. Light the candle.

Ask:

> IS THIS CANDLE SURROUNDED BY THE SAME AIR AS YOU BREATHE?
>
> WATCH CAREFULLY AND NOTICE WHAT HAPPENS. I AM GOING TO SET THE CANDLE INTO THE BOTTOM OF THIS JAR. (See Diagram 5-8.)
>
> IS THE AIR INSIDE THE JAR THE SAME AS THE AIR YOU BREATHE IN?
>
> I AM GOING TO PUT THE LID ON THE JAR. WHAT DO YOU THINK WILL HAPPEN?

Carefully screw the lid on the jar. Have the students watch until the flame goes out. Replenish the air in the jar by moving the jar through the air rapidly or by pushing a wad of paper in and out of the jar. Repeat this procedure and have a student time how long it takes for the flame to go out. Record the time it took for the flame to go out on the chalkboard.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ACCEPT ALL ANSWERS	
ving demonstration to illustrate that y component of inhaled air.	
on a piece of cardboard or heavy paper drops of melted wax on the paper and le on it as it hardens. Light the	
DLE SURROUNDED BY THE SAME AIR AS ?	--respond, "Yes," "I think so."
LLY AND NOTICE WHAT HAPPENS. I SET THE CANDLE INTO THE BOTTOM (See Diagram 5-8.)	
NSIDE THE JAR THE SAME AS THE AIR IN?	--respond, "Yes," "Sure."
O PUT THE LID ON THE JAR. WHAT DO LL HAPPEN?	--predict, "Nothing," "I don't know," "The candle will go out," "The jar will get hot," and so forth.
he lid on the jar. Have the students lame goes out. Replenish the air in the jar through the air rapidly or by paper in and out of the jar. Repeat d have a student time how long it takes go out. Record the time it took for the n the chalkboard.	--observe and note the duration of the flame.

MATERIALS	TEACHING STRATEGIES
	HINT: The flame is out when the puff of smoke first appears. Ask: WHAT HAPPENED TO THE LAST FLAME? HOW LONG DID IT BURN? WHY DID IT GO OUT? WHAT WOULD HAPPEN IF WE PUT A BUTTERFLY OR A MOUSE IN A JAR WITH A LID ON IT? WHY? WHAT WOULD HAPPEN IF WE PUT YOU INTO A BIG JAR WITH A LID ON IT? HOW LONG WOULD YOU LIVE? IMPORTANT: Relate this to the danger of playing in old refrigerators, or with plastic bags, and so forth. WHY DID THE CANDLE GO OUT? AIR IS MADE UP OF MANY PARTS. OUR BODIES USE ONLY SOME OF THESE PARTS. ONE PART OF AIR THAT IS VERY IMPORTANT TO US IS OXYGEN. Write "oxygen" on the chalkboard. IF THE OXYGEN FROM THE AIR IS GONE, A CANDLE CANNOT BURN. IF THE OXYGEN FROM THE AIR IS GONE, WE CANNOT LIVE.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
is out when the puff of smoke first	
D TO THE LAST FLAME?	--respond, "It went out," "It stopped burning."
IT BURN?	--indicate the number of seconds the candle burned.
O OUT?	--respond, "I don't know," "No air," and so forth.
APPEN IF WE PUT A BUTTERFLY OR A AR WITH A LID ON IT?	--respond, "It would die," "Suffocate."
	--respond, "Because it wouldn't have any air," "Need to punch holes."
APPEN IF WE PUT YOU INTO A BIG JAR N IT?	--respond, "We'd die," "We'd run out of air," "Suffocate."
LD YOU LIVE?	--infer they would live until the air ran out.
this to the danger of playing in old erators, or with plastic bags, and th.	
ANDLE GO OUT?	--respond, "It didn't have enough air."
P OF MANY PARTS. OUR BODIES USE ONLY PARTS. ONE PART OF AIR THAT IS VERY US IS OXYGEN.	
the chalkboard.	
FROM THE AIR IS GONE, A CANDLE	
FROM THE AIR IS GONE, WE CANNOT	

ACTIVITY
5-23

MATERIALS

TEACHING STRATEGIES

IN
S
S

WHAT PART OF THE AIR DID THE CANDLE RUN OUT OF?

A FLAME NEEDS OXYGEN TO BURN. WHAT WOULD BE ONE WAY YOU COULD PUT OUT A FIRE?

IF WE HAD A BUTTERFLY IN A COVERED JAR, WHY WOULD IT LIVE ONLY A LITTLE WHILE?

WHAT PART OF THE AIR DO WE NEED IN ORDER TO LIVE?

INVOLVE YOUR SLOWEST STUDENTS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
F THE AIR DID THE CANDLE RUN OUT OF?	--respond, "Oxygen."
DS OXYGEN TO BURN. WHAT WOULD BE ONE LD PUT OUT A FIRE?	--respond, "Take away the oxygen," "Smother it," "Cover it up."
BUTTERFLY IN A COVERED JAR, WHY WOULD Y A LITTLE WHILE?	--respond, "Because it would use up all the oxygen."
F THE AIR DO WE NEED IN ORDER TO LIVE?	--respond, "Oxygen."

Upon completion of this activity, ***each student*** *should, as a minimum:*

- *--have breathed in and out of a balloon.*
- *--have observed an increase and decrease in the size of the balloon.*
- *--have observed movements of another person's chest while that person is breathing.*
- *--be able to use the terms inhale and exhale properly.*
- *--have observed the extinction of the candle.*
- *--have inferred that the flame went out because it ran out of air.*
- *--have identified oxygen as an important part of air.*

MATERIALS	TEACHING STRATEGIES
	See Change of Pacers 22, 23, and 24.

✓ CHANGE

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

CHANGE OF PACER

ers 22, 23, and 24.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE E
ACTIVITY 5-23

Teacher _______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) _____________ Comment:

Specific Questions:

12. How many students understand the terms inhale and exhale?

RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. How many students understand the terms inhale and exhale?

13. Do you feel that the experiment was effective in demonstrating the necessity of oxygen? ☐ Yes ☐ No

Side A

UNIT V, CORE E
ACTIVITY 5-23

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air.

9. Realize that substances are continually added to air.

Core E Objectives for the Student:

1. Establish the need for air

2. Identify oxygen and carbon dioxide as components of air.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes, Finiteness of Resources

INQUIRY SKILLS:

Inferring

PROBLEM-SOLVING SKILLS:

Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:

Discussion Skills, How Our Body Works, Increased Vocabulary

Activity 5-24. Carbon Dioxide Is Part of Air

This activity will serve to establish one difference between inhaled and exhaled air. An experiment will be performed that will describe carbon dioxide as one difference between inhaled and exhaled air.

IVITY

ls for the Student:
Understand the composition of air.

Realize that substances are
continually added to air.

bjectives for the Student:
Establish the need for air

Identify oxygen and carbon dioxide
as components of air.

THEME:
ture of Processes, Finiteness of
s

:
g

G SKILLS:
g, Defending, Answering Why Questions

ICATION:
n Skills, How Our Body Works,
Vocabulary

bon Dioxide Is Part of Air

serve to establish one difference
exhaled air. An experiment will be
describe carbon dioxide as one
inhaled and exhaled air.

UNIT V. AIR AND WATER IN MY ENVIRONMENT

BSCS

CORE E. COMPONENTS OF AIR

ACTIVITY 5-24. CARBON DIOXIDE IS PART OF AIR

During this activity, each student should:

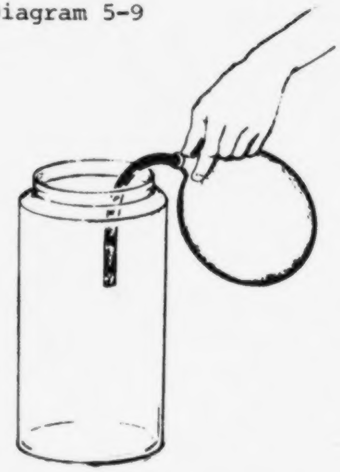
- *-recall the meaning of inhale and exhale.*
- *-observe the experiment with Jar A and Jar B.*
- *-infer the candle went out in Jar B because the air in it was different.*

ACTIVITY
5-24

MATERIALS

Vinyl tubing, 1/4-inch inside diameter, 1/16-inch wall, 12 inches long
Worksheet 5-12
Crucible tongs
*Balloon, 1
*Rubber band
*Glass jars, 2
*Birthday candles, 2
*Matches
*Cardboard or heavy paper

Diagram 5-9



*Not furnished in materials kit

TEACHING STRATEGIES

Begin by having the students recall the meaning and action of inhaling and exhaling.

Ask:

> WHAT HAPPENED TO THE BALLOON AS YOU BREATHED IN AND OUT?
>
> DO YOU THINK INHALED AIR IS DIFFERENT FROM EXHALED AIR?
>
> TODAY WE WILL WATCH A DEMONSTRATION TO FIND OUT IF YOUR EXHALED AIR IS DIFFERENT FROM YOUR INHALED AIR.

Begin the demonstration by following these directions:

1. Prepare two small cardboard bases for the candles (about one- to two-inches square).
2. Attach the candles to the cardboard bases with a drop of wax.
3. Attach a balloon to the vinyl tubing and secure it with a rubber band. (See Diagram 5-9.)
4. Label one of the jars "Jar A" and one "Jar B."

TEACHING STRATEGIES	**ANTICIPATED STUDENT BEHAVIORS**
	During this activity, each student should: *--describe exhaled air as being different from inhaled air.* *--describe more carbon dioxide and/or lack of oxygen as being the difference between inhaled and exhaled air.* *--discuss the drawing of the bubbles of air.* *--explain why the candle went out in Jar B.* *--explain why the candle did not go out in Jar A.* *--recall why the candle went out when a lid was put on the jar.* *--successfully complete Worksheet 5-12.*
the students recall the meaning and ing and exhaling.	Students should:
NED TO THE BALLOON AS YOU BREATHED ?	--recall the movement of air resulting from the inflation and deflation of the lungs.
NK INHALED AIR IS DIFFERENT FROM R?	--respond, "Yes," "No," "I don't know."
ILL WATCH A DEMONSTRATION TO FIND OUT IALED AIR IS DIFFERENT FROM YOUR R.	
tration by following these directions:	
o small cardboard bases for the candles - to two-inches square).	
candles to the cardboard bases with a x.	
alloon to the vinyl tubing and secure rubber band. (See Diagram 5-9.)	
of the jars "Jar A" and one "Jar B."	

MATERIALS

TEACHING STRATEGIES

Select a student to inflate the balloon. Then without removing his mouth from the tube, have him inhale and exhale six times. The balloon will deflate and inflate with each exchange. During this procedure, the reuse of the exhaled air will result in the accumulation of carbon dioxide in the balloon. After the last (sixth) breath, the student should pinch off the balloon with thumb and forefinger and keep it pinched off until the next step.

Then ask:

WHAT IS IN THE BALLOON?

Continue with the experiment.

5. Light the two candles and place one in Jar A. (See Diagram 5-8 in Activity 5-23 to see how to prepare the candle in the jar.)

6. Direct a student to place the end of the vinyl tube at the bottom of Jar B. (See Diagram 5-9.) While keeping the end of the tube at the bottom of the jar, allow the balloon to deflate slowly. This will fill the jar with exhaled air which contains much carbon dioxide.

7. Then quickly place the other lighted candle in Jar B. (See Diagram 5-8 in Activity 5-23 to see how to place the candle in the jar.) The flame should still be burning.

Now ask:

WHAT HAPPENED WHEN WE PUT THE CANDLE IN JAR B?

WHAT HAPPENED TO THE CANDLE WE PUT IN JAR A?

WHAT WAS THE CONTROL IN THIS DEMONSTRATION?

TEACHING STRATEGIES

to inflate the balloon. Then without
h from the tube, have him inhale and
The balloon will deflate and inflate
e. During this procedure, the reuse of
ill result in the accumulation of carbon
lloon. After the last (sixth) breath,
d pinch off the balloon with thumb and
ep it pinched off until the next step.

IE BALLOON?

experiment.

vo candles and place one in Jar A.
5-8 in Activity 5-23 to see how to
candle in the jar.)

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bottom of Jar B. (See Diagram 5-9.)
g the end of the tube at the bottom
allow the balloon to deflate slowly.
ll the jar with exhaled air which
h carbon dioxide.

place the other lighted candle in
Diagram 5-8 in Activity 5-23 to see
the candle in the jar.) The flame
be burning.

WHEN WE PUT THE CANDLE IN JAR B?

TO THE CANDLE WE PUT IN JAR A?

CONTROL IN THIS DEMONSTRATION?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "Air," "His breath," "His exhaled breath."

--respond, "It went out."

--respond, "It kept burning."

--indicate that Jar A was the control.

MATERIALS

TEACHING STRATEGIES

If students do not recall the meaning of control, remind them that it is something to compare other parts of the experiment with.

IN OUR LAST ACTIVITY (5-23) WE PUT A LID ON THE JAR TO MAKE THE CANDLE GO OUT. WHY DID THAT CANDLE GO OUT?

WHAT DOES A CANDLE NEED IN ORDER TO BURN?

WHY DID THE CANDLE IN JAR B GO OUT?

WHY DID THE CANDLE IN JAR B GO OUT WITHOUT A LID ON IT WHEN THE CANDLE IN OUR OTHER ACTIVITY WENT OUT ONLY WHEN WE PUT A LID ON THE JAR?

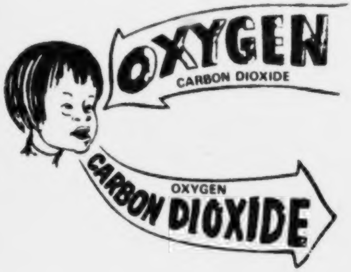
THE AIR WE PUT IN JAR B (point to Jar B) WAS EXHALED AIR, AIR WE BREATHE OUT. THE AIR IN JAR A (point to Jar A) AND IN OUR LAST EXPERIMENT WAS INHALED AIR, AIR WE BREATHE IN. WHAT IS THE DIFFERENCE BETWEEN THE AIR IN THE TWO JARS?

THERE IS LESS OXYGEN IN EXHALED AIR. HOW DO WE KNOW?

DOES ANYONE KNOW WHAT HAS TAKEN THE PLACE OF THE OXYGEN IN OUR EXHALED AIR?

OUR EXHALED BREATH HAS MOSTLY CARBON DIOXIDE IN IT. (Write "carbon dioxide" on the chalkboard.) OUR INHALED BREATH HAS MOSTLY OXYGEN IN IT. (Write "oxygen" on the chalkboard.)

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
tudents do not recall the meaning of rol, remind them that it is something mpare other parts of the experiment	
ST ACTIVITY (5-23) WE PUT A LID ON THE KE THE CANDLE GO OUT. WHY DID THAT OUT?	--recall Activity 5-23 and respond, "It ran out of air," "It didn't have enough oxygen."
A CANDLE NEED IN ORDER TO BURN?	--recall Activity 5-23 and respond, "Oxygen."
E CANDLE IN JAR B GO OUT?	--respond, "It didn't have any oxygen," "There was something different in the air," "It didn't have enough air."
E CANDLE IN JAR B GO OUT WITHOUT A WHEN THE CANDLE IN OUR OTHER ACTIVITY NLY WHEN WE PUT A LID ON THE JAR?	--respond, "There was different air in Jar B."
PUT IN JAR B (point to Jar B) WAS R, AIR WE BREATHE OUT. THE AIR IN nt to Jar A) AND IN OUR LAST WAS INHALED AIR, AIR WE BREATHE IS THE DIFFERENCE BETWEEN THE AIR IN RS?	--infer that since the exhaled air put out the flame there must be less oxygen in exhaled air.
ESS OXYGEN IN EXHALED AIR. HOW DO	--recall that the exhaled air put out the flame.
E KNOW WHAT HAS TAKEN THE PLACE OF IN OUR EXHALED AIR?	--speculate on what might take the place of oxygen.
D BREATH HAS MOSTLY CARBON DIOXIDE rite "carbon dioxide" on the chalk- UR INHALED BREATH HAS MOSTLY OXYGEN rite "oxygen" on the chalkboard.)	

MATERIALS	**TEACHING STRATEGIES**
	WE COULD DRAW A PICTURE THAT WOULD HELP US SEE THIS.
Diagram 5-10 	Draw a picture similar to Diagram 5-10 on the chalkboard. Discuss the drawing emphasizing that air breathed in is made mostly of oxygen.
	TO SHOW THAT THE AIR WE BREATHE IN HAS A LOT OF OXYGEN IN IT, AND ONLY A LITTLE CARBON DIOXIDE, WE WROTE THE WORD OXYGEN WITH BIG LETTERS AND THE WORD CARBON DIOXIDE WITH SMALL LETTERS.
	AIR WE BREATHE OUT IS MADE MOSTLY OF CARBON DIOXIDE. WRITE CARBON DIOXIDE IN LARGE LETTERS.
	WHY DID WE MAKE THE WORD CARBON DIOXIDE SO BIG?
	WHY DID WE MAKE THE WORD OXYGEN SO SMALL?
	When students have thoroughly discussed the drawing and its significance, continue by saying:
	NOW WE CAN BETTER EXPLAIN WHAT HAPPENED IN OUR EXPERIMENTS.
	Place Jar A and Jar B where they can be seen easily by all students. Have several students take turns explaining why the candle went out in Jar B, why the candle did not go out in Jar A, and why the candle went out in Activity 5-23 when the lid was put on the jar.
	If some students still do not understand the difference between inhaled and exhaled air, review the experiment and the drawing again.

EACHING STRATEGIES

I A PICTURE THAT WOULD HELP US

nilar to Diagram 5-10 on the chalkboard.
ng emphasizing that air breathed in is
ygen.

THE AIR WE BREATHE IN HAS A LOT
IT, AND ONLY A LITTLE CARBON
VROTE THE WORD OXYGEN WITH BIG
HE WORD CARBON DIOXIDE WITH
.

E OUT IS MADE MOSTLY OF CARBON
TE CARBON DIOXIDE IN LARGE

KE THE WORD CARBON DIOXIDE SO BIG?

KE THE WORD OXYGEN SO SMALL?

thoroughly discussed the drawing and
continue by saying:

TTER EXPLAIN WHAT HAPPENED IN OUR

r B where they can be seen easily by all
veral students take turns explaining
out in Jar B, why the candle did not
nd why the candle went out in Activity
vas put on the jar.

till do not understand the difference
exhaled air, review the experiment and

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "To show there is a lot of it in the air we breathe out."

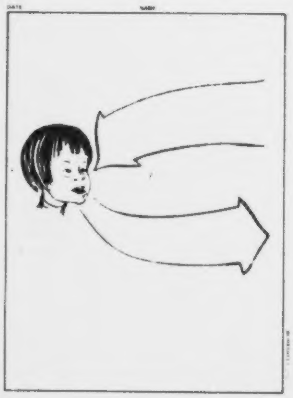
--respond, "To show that there is only a little of it in the air we breathe out."

--indicate their understanding of the components of inhaled and exhaled air by explaining what happened and why it happened in each jar.

ACTIVITY
5-24

MATERIALS

Worksheet 5-12



TEACHING STRATEGIES

Clues to Success

Distribute Worksheet 5-12 to each of the students. Direct them to write their names and the date on the top of the page.

On the chalkboard, write:

CARBON DIOXIDE	carbon dioxide
OXYGEN	oxygen

Be sure there is a distinct difference in the size of th letters.

Also write on the chalkboard "inhaled air" and "exhaled air."

Say:

LET'S SEE IF YOU CAN REMEMBER SOME OF THE THINGS ABOUT AIR THAT WE'VE TALKED ABOUT.

Instruct the students to label each bubble of air as inhaled or exhaled air.

Then instruct the students to write each one of the four words written on the chalkboard in the appropriate air bubble. Remind them that the size of the letters is different and that the difference should also show on their papers.

TEACHING STRATEGIES

s

sheet 5-12 to each of the students.
write their names and the date on the top

rd, write:

XIDE carbon dioxide
oxygen

s a distinct difference in the size of the

ne chalkboard "inhaled air" and "exhaled

IF YOU CAN REMEMBER SOME OF THE
UT AIR THAT WE'VE TALKED ABOUT.

dents to label each bubble of air as
led air.

e students to write each one of the four
the chalkboard in the appropriate air
them that the size of the letters is
at the difference should also show on

ANTICIPATED STUDENT BEHAVIORS

Students should:

--label the top bubble as inhaled air and the bottom bubble as exhaled air.

--write "OXYGEN" and "carbon dioxide" in the top bubble and "CARBON DIOXIDE" and "oxygen" in the bottom bubble.

MATERIALS

TEACHING STRATEGIES

Collect the papers. Discuss the correct answers with the students. If, after correcting the students' papers, you notice that some students are still uncertain about these concepts, help them individually before continuing with the next activity. Allow students to make the necessary corrections on their papers before the period ends or at some other appropriate time.

EACHING STRATEGIES

s. Discuss the correct answers with the
er correcting the students' papers, you
students are still uncertain about these
m individually before continuing with
. Allow students to make the necessary
ir papers before the period ends or at
iate time.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have observed the experiment with Jars A and B.*
- *--be able to identify inhaled and exhaled air as being different from one another.*
- *--have completed Worksheet 5-12.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE E
ACTIVITY 5-24

Teacher ______________

Activity name suggested by class:

BSCS USE:	Post ____	Tally ____	Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the experiment with the candles make clear the differences between inhaled and exhaled air? ☐ Yes ☐ No

RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) _______________ Comment:

Specific Questions:

12. Did the experiment with the candles make clear the differences between inhaled and exhaled air? ☐ Yes ☐ No

13. Was the use of Diagram 5-10 helpful in identifying the major components of inhaled and exhaled air? ☐ Yes ☐ No

14. Were any students still having problems at the end of this activity? ☐ Yes ☐ No
If so, what problems were they having?

Side A

UNIT V, CORE E
ACTIVITY 5-24

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air.

9. Realize that substances are continually added to air.

Core E Objectives for the Student:

2. Identify oxygen and carbon dioxide as components of air.

3. Relate the cycling of oxygen and carbon dioxide to life processes.

ENVIRONMENTAL THEME:

Complementarity of Organisms and Environment, Cyclic Nature of Processes

INQUIRY SKILLS:

Comparing

PROBLEM-SOLVING SKILLS:

Interpreting Results

PRACTICAL APPLICATION:

How the Body Works, Following Directions, Manipulation of Materials

Activity 5-25. Testing for Carbon Dioxide and Oxygen

This activity will enable students to identify two important components of air. They will test for both oxygen and carbon dioxide, using two test solutions.

IVITY

ls for the Student:
Understand the composition of air.

Realize that substances are continually added to air.

bjectives for the Student:
Identify oxygen and carbon dioxide as components of air.

Relate the cycling of oxygen and carbon dioxide to life processes.

THEME:
ntarity of Organisms and Environment,
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enable students to identify two s of air. They will test for both ioxide, using two test solutions.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE E. COMPONENTS OF AIR

ACTIVITY 5-25. TESTING FOR CARBON DIOXIDE AND OXYGEN

During this activity, each student should:

- *--recall that oxygen is the most important component of inhaled air to man.*
- *--recall that carbon dioxide is the most important component of exhaled air to man.*
- *--perform the experiment to test for the presence of oxygen.*
- *--perform the experiment to test for the presence of carbon dioxide.*

ACTIVITY
5-25

MATERIALS

1% Methylene blue
1000 ml Beaker
Hydrosulfite crystals
Water pipe test chamber, 1 per pair of students
Vinyl tubing, 1/4-inch diameter, about 2 feet for each test chamber
Oxygen test solution in dropping bottles (See special instructions in Teaching Strategies column)
Carbon dioxide test solution in dropping bottles
Hand pump, 1 per pair of students
*Balloons, 1 per pair of students
*Rubber bands, 1 per pair of students
*Tall jar, about 32 ounces, 1 per pair of students
*Water
*Sink or bucket for rinsing water pipes
*Toothpicks
*Spoon

*Not furnished in materials kit

TEACHING STRATEGIES

Begin this activity by having the students recall the difference between inhaled and exhaled air.

Ask:

> WHAT IS ONE THING WE FOUND IN THE AIR WE BREATHE?
>
> HOW DOES THE AIR WE INHALE, OR BREATHE IN, DIFFER FROM THE AIR WE EXHALE, OR BREATHE OUT?
>
> WHAT DID WE LEARN ABOUT OXYGEN FROM OUR EXPERIMENT WITH THE CANDLE?

Continue the discussion to reinforce the idea that we consume oxygen just as the candle did.

Then say:

> WHAT ARE SOME THINGS WE COULD DO TO SEE IF OXYGEN IS IN THE AIR?

The oxygen test solution must be diluted and decolorized for this experiment. To obtain the proper dilution of the oxygen test solution, add ten drops of the 1 percent methylene blue from your kit to 500 ml of water in a beaker. Then, immediately prior to use, add a minute amount of sodium hydrosulfite to turn the diluted methylene blue colorless. To do this, add only the quantity of powdered sodium hydrosulfite which can be

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ivity by having the students recall the ween inhaled and exhaled air.	
NE THING WE FOUND IN THE AIR WE BREATHE?	--recall, "Oxygen."
THE AIR WE INHALE, OR BREATHE IN, DIFFER AIR WE EXHALE, OR BREATHE OUT?	--recall that the air we breathe in is composed mainly of oxygen, and the air we breathe out contains more carbon dioxide than oxygen.
WE LEARN ABOUT OXYGEN FROM OUR EXPERIMENT CANDLE?	--recall that the candle continued to burn until the jar was covered. When the oxygen was used up, the candle went out. Infer that just as the candle needs oxygen to burn, we need it to live.
iscussion to reinforce the idea that we just as the candle did.	
SOME THINGS WE COULD DO TO SEE IF OXYGEN AIR?	--perhaps suggest different ways to find out if oxygen is in the air.
t solution must be diluted and decolorized iment. To obtain the proper dilution of t solution, add ten drops of the 1 percent from your kit to 500 ml of water in a immediately prior to use, add a minute um hydrosulfite to turn the diluted colorless. To do this, add only the wdered sodium hydrosulfite which can be	

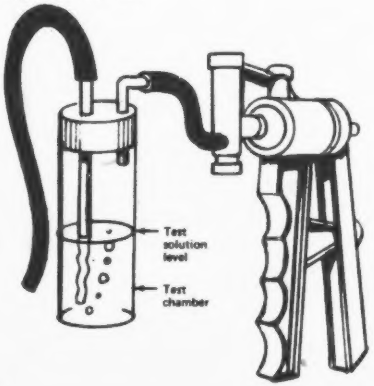
picked up on a toothpick while constantly stirring the solution with a spoon. If this addition does not turn the blue solution colorless, add another toothpick measure of sodium hydrosulfite while stirring. Repeat until the solution is colorless.

Hold up the oxygen test solution (colorless methylene blue), and say:

> YOU MADE SOME GOOD SUGGESTIONS ABOUT WAYS TO FIND OUT IF OXYGEN IS IN THE AIR. WOULD YOU LIKE TO SEE HOW A SCIENTIST MIGHT DO IT? THIS IS THE TEST SOLUTION HE MIGHT USE TO TEST FOR OXYGEN. IF OXYGEN IS PRESENT IN THE AIR THE SOLUTION WILL TURN BLUE.
>
> WHAT IS A TEST SOLUTION?

HAVE ST
WORK I

Diagram 5-11



Distribute the water pipes, oxygen test solution, and hand pump to each student pair. Give the following directions, one at a time, to the students.

1. Fill the water pipe chamber with water up to the mark. (Refer to Diagram 5-11.)
2. Add an equal volume of the oxygen test solution to the water.

SAVE EXC
SOLUTION FOR

EACHING STRATEGIES

othpick while constantly stirring the
poon. If this addition does not turn
colorless, add another toothpick
hydrosulfite while stirring. Repeat
n is colorless.

a test solution (colorless methylene

GOOD SUGGESTIONS ABOUT WAYS TO FIND
IS IN THE AIR. WOULD YOU LIKE TO
ENTIST MIGHT DO IT? THIS IS THE
HE MIGHT USE TO TEST FOR OXYGEN.
PRESENT IN THE AIR THE SOLUTION
E.

T SOLUTION?

HAVE STUDENTS
WORK IN PAIRS

er pipes, oxygen test solution, and hand
nt pair. Give the following directions,
the students.

er pipe chamber with water up to the
r to Diagram 5-11.)

volume of the oxygen test solution to

SAVE EXCESS TEST
SOLUTION FOR ACTIVITY 5-26

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recall that a test solution is used to find out if a certain substance is present.

--fill the test chamber with water.

--put two drops of the test solution in the water.

MATERIALS

TEACHING STRATEGIES

3. Attach a short piece of vinyl tubing to the bent tube of the test chamber.

4. Attach the hand pump to the other end of the tubi (See Diagram 5-11.)

5. Do not attach any vinyl tubing to the straight tube on the cap. Cap the test chamber.

Explain to the students that when they work the pump, it will draw air through the water pipe. In doing so, the fresh air will pass through the test solution. If oxygen is present in the air, the solution will turn blu

6. Direct one of the students in each pair (the othe will have a turn to pump later during the carbon dioxide test) to begin to draw air through the chamber by slowly working the hand pump. Caution the student to pump slowly so as not to draw test solution into their tubing and into the pump.

The test solution will slowly turn blue as a continual supply of oxygen is brought in contact with it.

Ask:

WHAT DID WE PUMP THROUGH THE TEST SOLUTION?

WHAT HAPPENED TO THE TEST SOLUTION IN THE WATER PUMP?

WHAT DOES THIS TELL US ABOUT THE AIR WE BREATHE?

Explain that this test solution will be used later in another activity (Activity 5-26).

Now direct the students' attention to the air we breathe out, or exhale.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
a short piece of vinyl tubing to the bent the test chamber.	--attach the tubing.
he hand pump to the other end of the tubing. agram 5-11.)	--attach the hand pump.
ttach any vinyl tubing to the straight the cap. Cap the test chamber.	
students that when they work the pump, it through the water pipe. In doing so, the pass through the test solution. If ent in the air, the solution will turn blue.	
ne of the students in each pair (the other e a turn to pump later during the carbon test) to begin to draw air through the by slowly working the hand pump. Caution ent to pump slowly so as not to draw test into their tubing and into the pump.	--slowly work the hand pump.
ion will slowly turn blue as a continual en is brought in contact with it.	
WE PUMP THROUGH THE TEST SOLUTION?	--respond, "Regular air," "Oxygen," "Air we breathe."
ENED TO THE TEST SOLUTION IN THE WATER	--indicate that it turned blue.
THIS TELL US ABOUT THE AIR WE BREATHE?	--respond, "It contains oxygen."
his test solution will be used later in ty (Activity 5-26).	
students' attention to the air we breathe	

MATERIALS	TEACHING STRATEGIES
	Ask: WHAT DO WE KNOW FOR SURE ABOUT THE AIR WE EXHALE, OR BREATHE OUT? Say: WE DISCOVERED THAT OUR EXHALED BREATH WAS DIFFERENT FROM OUR INHALED BREATH. HOW WAS IT DIFFERENT? WHAT COULD WE DO TO PROVE THAT THERE IS CARBON DIOXIDE IN THE AIR? Hold up the carbon dioxide test solution (bromthymol blue) and say: THIS IS THE TEST SOLUTION FOR CARBON DIOXIDE. IF THERE IS CARBON DIOXIDE PRESENT IN THE AIR, IT WILL TURN YELLOW. HOW COULD WE GET A SAMPLE OF EXHALED BREATH? If students do not suggest a set up similar to the one in Activity 5-24, ask: HOW DID WE GET THE SAMPLE OF EXHALED AIR IN OUR LAST ACTIVITY WHEN WE PUT OUT THE CANDLE AS WE LOWERED IT INTO THE JAR? WHERE DID THE AIR IN THAT BALLOON COME FROM? WAS IT EXHALED BREATH OR INHALED BREATH THAT WAS IN THE BALLOON?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
KNOW FOR SURE ABOUT THE AIR WE EXHALE, UT?	--respond, "It's different," "It made the candle go out," "It contains carbon dioxide."
D THAT OUR EXHALED BREATH WAS OM OUR INHALED BREATH. HOW WAS ?	--recall Activity 5-24 and respond, "It had less oxygen," "It has carbon dioxide."
E DO TO PROVE THAT THERE IS CARBON HE AIR?	--suggest using a test solution to do an experiment similar to the oxygen test.
n dioxide test solution (bromthymol blue)	
TEST SOLUTION FOR CARBON DIOXIDE. IF BON DIOXIDE PRESENT IN THE AIR, IT WILL	
GET A SAMPLE OF EXHALED BREATH?	--suggest blowing up a balloon and emptying it into a jar, as done in Activity 5-24.
ents do not suggest a set up similar one in Activity 5-24, ask:	
WE GET THE SAMPLE OF EXHALED AIR IN ACTIVITY WHEN WE PUT OUT THE CANDLE WERED IT INTO THE JAR?	--recall that they inflated a balloon and let out the air into a jar.
AIR IN THAT BALLOON COME FROM?	--state that since they inflated the balloon, the air came from them.
D BREATH OR INHALED BREATH THAT WAS N?	--recall that it was exhaled breath.

MATERIALS

TEACHING STRATEGIES

IF WE TESTED THE AIR FROM THE BALLOON WITH OUR WATER PIPE AND PUMP, WHAT DO YOU THINK WOULD HAPPEN TO THE TEST SOLUTION?

WHY WOULD THE TEST SOLUTION TURN YELLOW?

Tell the students that during this test they will use th pump to pull the air from the jar through the test solution, and if there is carbon dioxide in that air the solution will turn yellow.

Give the following directions, one at a time, to the students.

1. Rinse out the test chamber in a sink or bucket of water.

2. Fill the chamber to the top mark with water and ad three drops of carbon dioxide test solution.

SAVE
SOLUTION

3. Attach another piece of vinyl tubing to the long straight tube. (See Diagram 5-11.)

4. Prepare a sample of exhaled air using the balloon method as described in Activity 5-24 and shown in Diagram 5-9. Slowly release the exhaled air from the balloon into the jar. (One student should carry out this step while the other member of the pair carries out Step 5.)

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
STED THE AIR FROM THE BALLOON WITH OUR PE AND PUMP, WHAT DO YOU THINK WOULD D THE TEST SOLUTION?	--predict that the test solution would turn yellow.
D THE TEST SOLUTION TURN YELLOW?	--respond, "Because the air has carbon dioxide in it."
ents that during this test they will use the the air from the jar through the test if there is carbon dioxide in that air the turn yellow.	
owing directions, one at a time, to the	
t the test chamber in a sink or bucket r.	--rinse the test chamber.
chamber to the top mark with water and add rops of carbon dioxide test solution.	--fill the test chamber with water and add the test solution.

SAVE EXCESS TEST
SOLUTION FOR ACTIVITY 5-26

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
nother piece of vinyl tubing to the long tube. (See Diagram 5-11.)	--attach the tubing.
a sample of exhaled air using the balloon s described in Activity 5-24 and shown in 5-9. Slowly release the exhaled air from oon into the jar. (One student should t this step while the other member of the ries out Step 5.)	--prepare a sample of exhaled air.

MATERIALS	TEACHING STRATEGIES
	5. Quickly put the free end of the vinyl tubing into the bottom part of the jar containing the exhaled breath and begin to pump. In a very short time, the test solution should turn from blue to yellow, indicating the presence of carbon dioxide. Then ask: WHAT DID WE PUMP THROUGH THE TEST SOLUTION? WHAT HAPPENED TO THE TEST SOLUTION IN THE WATER PIPE? WHAT DOES THIS TELL US ABOUT THE AIR WE BREATHE OUT OR EXHALE? WHAT DO WE KNOW FOR SURE ABOUT THE DIFFERENCE BETWEEN INHALED AND EXHALED AIR?

EACHING STRATEGIES

the free end of the vinyl tubing into
art of the jar containing the exhaled
egin to pump.

me, the test solution should turn from
dicating the presence of carbon dioxide.

UMP THROUGH THE TEST SOLUTION?

TO THE TEST SOLUTION IN THE WATER

S TELL US ABOUT THE AIR WE BREATHE
?

OW FOR SURE ABOUT THE DIFFERENCE
ED AND EXHALED AIR?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--put the vinyl tubing into the jar and begin to pump.

--respond, "Carbon dioxide," "Exhaled air," "Air we breathe out."

--indicate that it turned from blue to yellow.

--respond, "It has carbon dioxide in it," "It's different air," "It's different from the air we breathe in."

--recall Activity 5-24 and indicate that inhaled air is mostly oxygen and exhaled air is mostly carbon dioxide.

Upon completion of this activity, each student should, as a minimum:

--recall that inhaled air is different from exhaled air.
--have performed the experiment to test for the presence of oxygen.
--have performed the experiment to test for the presence of carbon dioxide.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE E
ACTIVITY 5-25

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the instructions for the carbon dioxide and oxygen tests clear? ☐ Yes ☐ No

13. Did the students have any difficulties working the pumps correctly? ☐ Yes ☐ N

MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the instructions for the carbon dioxide and oxygen tests clear? ☐ Yes ☐ No

13. Did the students have any difficulties working the pumps correctly? ☐ Yes ☐ No
Comment.

14. Were students able to relate the change in color of the test solution to the presence of oxygen or carbon dioxide? ☐ Yes ☐ No

15. Did you have any problems mixing the oxygen test solution? ☐ Yes ☐ No

Side A

UNIT V, CORE E
ACTIVITY 5-25

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air

9. Realize that substances are continually added to air.

Core E Objectives for the Student:

2. Identify oxygen and carbon dioxide as components of air.

3. Relate the cycling of oxygen and carbon dioxide to life processes.

ENVIRONMENTAL THEME:

Complementarity of Organisms and Environment, Cyclic Nature of Processes

INQUIRY SKILLS:

Inferring

PROBLEM-SOLVING SKILLS:

Drawing Conclusions, Explaining

PRACTICAL APPLICATION:

Realizing the Importance of Preserving Plants, Verbal Communication

Activity 5-26. Natural Sources of Oxygen and Carbon Dioxide

This activity is designed to identify sources of carbon dioxide and oxygen in the environment. After setting up the snail-elodea experiment, the students will be able

TIVITY

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Understand the composition of air

Realize that substances are
continually added to air.

Objectives for the Student:
Identify oxygen and carbon dioxide
as components of air.

Relate the cycling of oxygen and
carbon dioxide to life processes.

L THEME:
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Nature of Processes

LS:
ng

ING SKILLS:
Conclusions, Explaining

PLICATION:
ng the Importance of Preserving
Verbal Communication

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rbon Dioxide

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BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE E. COMPONENTS OF AIR

ACTIVITY 5-26. NATURAL SOURCES OF OXYGEN AND CARBON DIOXIDE

During this activity, each student should:

--recall that oxygen and carbon dioxide are the components of air that are important to man.
--set up the snail and Elodea experiment.
--predict which tubes will indicate carbon dioxide and which oxygen when tested.

ACTIVITY
5-26

MATERIALS

Worksheet 5-13
Slide 5-50
Test tubes, 4 per student group
Rubber stoppers, 4 per student group
Test tube rack, 1 per student group
Bromthymol blue solution, (carbon dioxide test solution)
Methylene blue, decolorized, (oxygen test solution)
*Small water snails, 2 per student group
*Elodea (*Anacharis*) is a dish of water, 2 pieces per student group
*Pond or aquarium water, 1/2 gallon
*Desk lamp with 100-watt bulb, 1 or more
*Household ammonia
*Masking tape

*Not furnished in materials kit

TEACHING STRATEGIES

to infer that animals are dependent on plants for oxyge and that plants are dependent on animals for carbon dioxide. They should also be able to relate this interdependence to the total environment.

Teacher Preparation:

1. Elodea (el-uh-DEE-uh) for this activity must be obtained fresh from a pet shop or dime store that sells aquarium supplies. Plants should be bright green in color.

2. Obtain pond water from any pond or use water from an aquarium or classroom pond that has been set up for a long time. Any pet shop should be willing to supply you with a half-gallon of aged water. If you are not able to acquire any pond or aquarium water, see Number 2 in the Teacher Preparation Section of Activity 5-20.

3. CAUTION: This activity demonstrates that the carbon dioxide exhaled by the snail will cause the pond water to turn yellow when tested with the carbon dioxide test solution. To insure that this will work, there must be NO carbon dioxide in the pond water at the beginning of the experiment. THE WATER MUST TEST BLUE!

TEACHING STRATEGIES

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ts are dependent on animals for carbon
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ce to the total environment.

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ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--describe what happened in each tube during the carbon dioxide test.*
- *--describe what happened in each tube during the oxygen test.*
- *--infer that plants give off oxygen.*
- *--infer that animals give off carbon dioxide.*
- *--appreciate the interdependence of plants and animals.*
- *--explain the phrase, "Have you thanked a green plant today?"*
- *--complete Worksheet 5-13.*

MATERIALS

TEACHING STRATEGIES

To test, add six drops of test solution to a test tube sample of the pond water. If the sample turns green or blue, use the pond water as is. If the sample of pond water turns yellow, there is carbon dioxide present which must be removed before starting. To remove, add two drops of household ammonia to the whole supply of pond water. Take a test tube sample and again test for color with three drops of carbon dioxide test solution. If still yellow, add two more drops of ammonia to the water.

Begin by saying:

WHERE DO CARBON DIOXIDE AND OXYGEN COME FROM?

DO YOU THINK YOU COULD FIND CARBON DIOXIDE AND OXYGEN ANYWHERE ELSE?

HOW COULD YOU FIND OUT IF CARBON DIOXIDE AND OXYGEN COULD BE FOUND ANYWHERE ELSE?

WE'RE GOING TO USE A PLANT AND AN ANIMAL TO SEE IF THEY WILL GIVE US SOME CLUES TO OTHER PLACES THAT MIGHT PRODUCE OXYGEN AND CARBON DIOXIDE.

LET'S SEE IF THERE IS ANY CARBON DIOXIDE IN THE POND WATER.

WHAT COLOR WILL THE POND WATER TURN IF THERE IS CARBON DIOXIDE IN IT?

Test a sample of pond water with six drops of test solution and ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT B
	Students should:
To test, add six drops of test solution to a test tube sample of the pond water. If the sample turns green or blue, use the pond water as is. If the sample of pond water turns yellow, there is carbon dioxide present which must be removed before starting. To remove, add two drops of household ammonia to the whole supply of pond water. Take a test tube sample and again test for color with three drops of carbon dioxide test solution. If still yellow, add two more drops of ammonia to the water.	
Begin by saying:	
WHERE DO CARBON DIOXIDE AND OXYGEN COME FROM?	--recall Activities 5-22 t "From air."
DO YOU THINK YOU COULD FIND CARBON DIOXIDE AND OXYGEN ANYWHERE ELSE?	--speculate on other sourc and oxygen.
HOW COULD YOU FIND OUT IF CARBON DIOXIDE AND OXYGEN COULD BE FOUND ANYWHERE ELSE?	--suggest an experiment to dioxide and oxygen come
WE'RE GOING TO USE A PLANT AND AN ANIMAL TO SEE IF THEY WILL GIVE US SOME CLUES TO OTHER PLACES THAT MIGHT PRODUCE OXYGEN AND CARBON DIOXIDE.	
LET'S SEE IF THERE IS ANY CARBON DIOXIDE IN THE POND WATER.	
WHAT COLOR WILL THE POND WATER TURN IF THERE IS CARBON DIOXIDE IN IT?	--respond, "It turns yellow
Test a sample of pond water with six drops of test solution and ask:	

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ld six drops of test solution to a test of the pond water. If the sample turns ue, use the pond water as is. If the ond water turns yellow, there is carbon sent which must be removed before To remove, add two drops of household the whole supply of pond water. Take sample and again test for color with of carbon dioxide test solution. If w, add two more drops of ammonia to	Students should:
BON DIOXIDE AND OXYGEN COME FROM?	--recall Activities 5-22 through 5-25 and respond, "From air."
YOU COULD FIND CARBON DIOXIDE AND ERE ELSE?	--speculate on other sources of carbon dioxide and oxygen.
U FIND OUT IF CARBON DIOXIDE AND BE FOUND ANYWHERE ELSE?	--suggest an experiment to find out where carbon dioxide and oxygen come from.
TO USE A PLANT AND AN ANIMAL Y WILL GIVE US SOME CLUES TO THAT MIGHT PRODUCE OXYGEN AND E.	
THERE IS ANY CARBON DIOXIDE IN R.	
LL THE POND WATER TURN IF THERE XIDE IN IT?	--respond, "It turns yellow."
ond water with six drops of test	

ACTIVITY
5-26

MATERIALS

TEACHING STRATEGIES

IS THERE CARBON DIOXIDE IN THE WATER AS WE START THE TEST?

HOW DO YOU KNOW?

Hold up the oxygen test solution, which was saved from the previous activity, and say:

HERE IS OXYGEN TEST SOLUTION. WHAT COLOR WOULD THE POND WATER TURN IF IT CONTAINED OXYGEN?

Test a sample of pond water using an equal amount of tes solution and water.

DOES THE POND WATER CONTAIN OXYGEN AS WE START THE EXPERIMENT?

Divide the class into four groups. Two groups will conduct the oxygen portion of the activity and the other two groups will experiment with carbon dioxide. Distribute masking tape, four test tubes, and four stoppers to each group. Have each group do the following:

1. Number the test tubes from one to four.
2. Half-fill each tube with pond or aquarium water.
3. To Tube 1 add a small snail.
4. To Tube 2 add a fresh leafy stem of elodea.
5. To Tube 3 add elodea and a small snail. (See Diagram 5-12.)

WHAT SHOULD WE ADD TO THIS LAST TUBE?

IALS	TEACHING STRATEGIES	ANTICIPATED STUD
		Students should:
	IS THERE CARBON DIOXIDE IN THE WATER AS WE START THE TEST?	--respond, "No."
	HOW DO YOU KNOW?	--relate the blue color t dioxide.
	Hold up the oxygen test solution, which was saved from the previous activity, and say:	
	HERE IS OXYGEN TEST SOLUTION. WHAT COLOR WOULD THE POND WATER TURN IF IT CONTAINED OXYGEN?	--recall that the test sol
	Test a sample of pond water using an equal amount of test solution and water.	
	DOES THE POND WATER CONTAIN OXYGEN AS WE START THE EXPERIMENT?	--respond, "Yes."
	Divide the class into four groups. Two groups will conduct the oxygen portion of the activity and the other two groups will experiment with carbon dioxide. Distribute masking tape, four test tubes, and four stoppers to each group. Have each group do the following:	
	1. Number the test tubes from one to four. 2. Half-fill each tube with pond or aquarium water. 3. To Tube 1 add a small snail. 4. To Tube 2 add a fresh leafy stem of elodea. 5. To Tube 3 add elodea and a small snail. (See Diagram 5-12.)	
	WHAT SHOULD WE ADD TO THIS LAST TUBE?	--suggest leaving this tub would have something to with.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
RBON DIOXIDE IN THE WATER AS WE EST?	--respond, "No."
NOW?	--relate the blue color to the absence of carbon dioxide.
en test solution, which was saved from ivity, and say:	
GEN TEST SOLUTION. WHAT COLOR WOULD TER TURN IF IT CONTAINED OXYGEN?	--recall that the test solution turns blue.
pond water using an equal amount of test er.	
ND WATER CONTAIN OXYGEN AS WE START ENT?	--respond, "Yes."
into four groups. Two groups will en portion of the activity and the will experiment with carbon dioxide. ng tape, four test tubes, and four group. Have each group do the	
test tubes from one to four.	
each tube with pond or aquarium water.	
dd a small snail.	
dd a fresh leafy stem of elodea.	
dd elodea and a small snail. (See 12.)	
WE ADD TO THIS LAST TUBE?	--suggest leaving this tube with water only so they would have something to compare the other tubes with.

MATERIALS

TEACHING STRATEGIES

IS THERE CARBON DIOXIDE IN THE WATER AS WE START THE TEST?

HOW DO YOU KNOW?

Hold up the oxygen test solution, which was saved from the previous activity, and say:

HERE IS OXYGEN TEST SOLUTION. WHAT COLOR WOULD THE POND WATER TURN IF IT CONTAINED OXYGEN?

Test a sample of pond water using an equal amount of tes solution and water.

DOES THE POND WATER CONTAIN OXYGEN AS WE START THE EXPERIMENT?

Divide the class into four groups. Two groups will conduct the oxygen portion of the activity and the other two groups will experiment with carbon dioxide. Distribute masking tape, four test tubes, and four stoppers to each group. Have each group do the following:

1. Number the test tubes from one to four.
2. Half-fill each tube with pond or aquarium water.
3. To Tube 1 add a small snail.
4. To Tube 2 add a fresh leafy stem of elodea.
5. To Tube 3 add elodea and a small snail. (See Diagram 5-12.)

WHAT SHOULD WE ADD TO THIS LAST TUBE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
CARBON DIOXIDE IN THE WATER AS WE E TEST?	--respond, "No."
U KNOW?	--relate the blue color to the absence of carbon dioxide.
ygen test solution, which was saved from ctivity, and say:	
XYGEN TEST SOLUTION. WHAT COLOR WOULD WATER TURN IF IT CONTAINED OXYGEN?	--recall that the test solution turns blue.
of pond water using an equal amount of test ater.	
POND WATER CONTAIN OXYGEN AS WE START IMENT?	--respond, "Yes."
ss into four groups. Two groups will ygen portion of the activity and the ps will experiment with carbon dioxide. king tape, four test tubes, and four ch group. Have each group do the	
he test tubes from one to four.	
l each tube with pond or aquarium water.	
1 add a small snail.	
2 add a fresh leafy stem of elodea.	
3 add elodea and a small snail. (See 5-12.)	
LD WE ADD TO THIS LAST TUBE?	--suggest leaving this tube with water only so they would have something to compare the other tubes with.

MATERIALS	TEACHING STRATEGIES

WHAT NAME DO WE GIVE TO SOMETHING WE USE AS A COMPARISON?

GIVE S
TIME
TO
THINK

6. Have the groups of students testing for oxygen fill the remainder of each test tube with oxygen test solution.

7. Have the students who are testing for carbon dioxide add six drops of carbon dioxide test solution to each test tube. Add pond water to each tube to fill completely the remaining space in each tube.

Direct the students to continue preparing the experiment.

8. Place a rubber stopper in each test tube.

9. When all tubes are stoppered, place them in a test tube rack.

10. Arrange a desk lamp about six inches from the tubes so that the light falls directly on the tubes.

Ask:

WHAT IS IN TUBE 1?

WHAT IS IN TUBE 2?

WHAT IS IN TUBE 3?

GIVE STUDENTS
TIME
TO
THINK

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
DO WE GIVE TO SOMETHING WE USE AS A N?	--identify the comparison tube as a control.
groups of students testing for ll the remainder of each test oxygen test solution.	
students who are testing for carbon dd six drops of carbon dioxide test to each test tube. Add pond water to to fill completely the remaining each tube.	
ents to continue preparing the experiment.	
ubber stopper in each test tube.	
tubes are stoppered, place them in a rack.	
desk lamp about six inches from the hat the light falls directly on the	--prepare the experimental setup as directed.
TUBE 1?	--identify Tube 1 as containing a snail.
TUBE 2?	--identify Tube 2 as containing a plant.
TUBE 3?	--identify Tube 3 as containing a snail and a plant.

MATERIALS

TEACHING STRATEGIES

WHAT IS IN TUBE 4?

TOMORROW WE WILL OBSERVE THE TEST TUBE FOR CHANGES IN THE CARBON DIOXIDE AND OXYGEN TEST SOLUTIONS TO SEE IF ANY OF THE TUBES CONTAIN CARBON DIOXIDE, OXYGEN, OR BOTH.

WHAT TEST TUBES DO YOU THINK WILL HAVE CARBON DIOXIDE IN THEM TOMORROW?

Record the students' predictions on the chalkboard.

WHICH TEST TUBES DO YOU THINK WILL HAVE OXYGEN IN THEM?

Record the students' predictions on the chalkboard. Sav these predictions until the next day.

The test tube setup should remain undisturbed for about twenty-four hours.

The next day remind the students that two of the groups are testing their four tubes for oxygen and the other two teams are testing their four tubes for carbon dioxide.

Hold the bromthymol blue solution in front of the class and say:

THIS IS THE CARBON DIOXIDE TEST SOLUTION THAT WE PUT IN SOME OF THE TEST TUBES.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
IN TUBE 4?	--identify Tube 4 as containing only pond water.
WE WILL OBSERVE THE TEST TUBE FOR IN THE CARBON DIOXIDE AND OXYGEN TEST S TO SEE IF ANY OF THE TUBES CONTAIN IOXIDE, OXYGEN, OR BOTH.	
T TUBES DO YOU THINK WILL HAVE IOXIDE IN THEM TOMORROW?	--predict which tubes will test positive for carbon dioxide.
udents' predictions on the chalkboard.	
ST TUBES DO YOU THINK WILL HAVE OXYGEN	--predict which tubes will test positive for oxygen.
udents' predictions on the chalkboard. Save ions until the next day.	
setup should remain undisturbed for four hours.	
WORK TIME	
remind the students that two of the sting their four tubes for oxygen and the ms are testing their four tubes for carbon	
thymol blue solution in front of the class	
THE CARBON DIOXIDE TEST SOLUTION THAT N SOME OF THE TEST TUBES.	--recall Activity 5-25.

MATERIALS	TEACHING STRATEGIES
	Ask: HOW DOES THIS TEST SOLUTION TELL US THAT CARBON DIOXIDE IS PRESENT? IN WHICH TEST TUBES DID WE PUT THIS TEST SOLUTION? WAS THERE CARBON DIOXIDE IN THE POND WATER WHEN WE STARTED YESTERDAY? WHAT COLOR WAS THE WATER IN THE TUBES? WHICH TUBES CHANGED COLOR? WHICH TUBES HAVE CARBON DIOXIDE IN THEM? WHAT LIVING THING IS IN THE TUBE WHERE THE COLOR CHANGE OCCURRED? WHY DID THE COLOR CHANGE IN THE TUBE WITH THE SNAIL IN IT? WHY DIDN'T THE COLOR CHANGE IN TUBE 2? WHY DIDN'T THE COLOR CHANGE IN TUBE 4? IF THERE IS A SNAIL IN TUBE 3, WHY DIDN'T WE SEE A COLOR CHANGE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HIS TEST SOLUTION TELL US THAT CARBON PRESENT?	--respond, "It turns yellow or yellow-green."
EST TUBES DID WE PUT THIS TEST SOLUTION?	--respond with which tubes the carbon dioxide test solution is in.
ARBON DIOXIDE IN THE POND WATER WHEN YESTERDAY?	--respond, "No."
WAS THE WATER IN THE TUBES?	--recall the blue color.
CHANGED COLOR?	--observe and respond accordingly. (The change should be noted in Tube 1.)
HAVE CARBON DIOXIDE IN THEM?	--relate the change of color to the presence of carbon dioxide and respond accordingly. (Probably Tube 1.)
THING IS IN THE TUBE WHERE THE E OCCURRED?	--respond, "Snail."
COLOR CHANGE IN THE TUBE WITH THE ?	--infer that the carbon dioxide test solution is being changed in color because the snail is producing carbon dioxide.
HE COLOR CHANGE IN TUBE 2?	--infer that there is no color change in Tube 2 because there was no carbon dioxide produced; infer that no carbon dioxide accumulates in the presence of elodea alone.
HE COLOR CHANGE IN TUBE 4?	--infer that there is no color change in Tube 4 because there is nothing there to produce carbon dioxide.
A SNAIL IN TUBE 3, WHY DIDN'T WE CHANGE?	--respond, "I don't know."

ACTIVITY
5-26

MATERIALS

TEACHING STRATEGIES

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THI**

LET'S REVIEW WHAT HAPPENED IN TUBE 3.

WHAT IS IN TUBE 3?

IS ANYTHING GIVING OFF CARBON DIOXIDE?

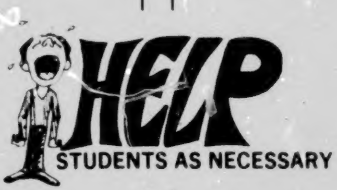
HOW DO WE KNOW?

THE TEST DID NOT SHOW CARBON DIOXIDE IN TUBE 3. WHAT HAPPENED TO IT?

WE MADE PREDICTIONS ABOUT WHERE WE WOULD FIND CARBON DIOXIDE. WHERE DID WE FIND IT?

Check the predictions made previously and listed on the chalkboard.

WE FOUND OUT WHICH TUBES HAD CARBON DIOXIDE PRESENT. NOW LET'S SEE WHICH HAVE OXYGEN PRESENT.



GIVE STUDENTS
TIME
TO
THINK

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
VIEW WHAT HAPPENED IN TUBE 3.	
IN TUBE 3?	--identify the snail and a plant.
ING GIVING OFF CARBON DIOXIDE?	--identify the snail as giving off carbon dioxide.
E KNOW?	--recall that Tube 1 tested positive for carbon dioxide.
DID NOT SHOW CARBON DIOXIDE IN TUBE 3. PENED TO IT?	--speculate that the plant used up the carbon dioxide.
PREDICTIONS ABOUT WHERE WE WOULD FIND IOXIDE. WHERE DID WE FIND IT?	--respond, "In Tube 1."
dictions made previously and listed on the	--check their predictions.
OUT WHICH TUBES HAD CARBON DIOXIDE NOW LET'S SEE WHICH HAVE OXYGEN	

MATERIALS	TEACHING STRATEGIES
	Direct the other half of the student groups to get their test tubes. They will test the tubes for oxygen while the first half observes. Hold up the oxygen test solution before the class and say: THIS IS OXYGEN TEST SOLUTION THAT WE PUT IN THESE TEST TUBES. WHAT HAPPENS TO IT IF OXYGEN IS PRESENT? WAS THERE ANY OXYGEN IN THE POND WATER WHEN WE STARTED YESTERDAY? Direct students to hold each tube against white paper to detect any color change. The more oxygen that is present, the deeper blue the solution will turn. Then ask: WHICH TUBES ARE NOW MOST BLUE? WHICH TUBES HAVE OXYGEN IN THEM? WHAT COLOR IS THE WATER IN TUBE 4? WHAT DOES THIS TELL US ABOUT THE WATER? TUBE 1 IS NOT AS BLUE AS THE OTHER TUBES. WHY? WE SAW THAT THERE WAS OXYGEN IN THE WATER IN TUBE 4. WAS THE WATER IN TUBE 1 THE SAME AS THAT IN TUBE 4 WHEN WE STARTED?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
r half of the student groups to get their ey will test the tubes for oxygen while bserves. Hold up the oxygen test the class and say:	
GEN TEST SOLUTION THAT WE PUT IN TUBES. WHAT HAPPENS TO IT IF OXYGEN ?	--recall Activity 5-25 and state that it will turn blue.
NY OXYGEN IN THE POND WATER WHEN YESTERDAY?	--respond, "Yes."
to hold each tube against white paper lor change. The more oxygen that is per blue the solution will turn.	
ARE NOW MOST BLUE?	--state that Tubes 2, 3, and 4 are the most blue and that Tube 1 is clear.
HAVE OXYGEN IN THEM?.	--relate the blue color to the presence of oxygen and state that Tubes 2, 3, and 4 have oxygen in them.
IS THE WATER IN TUBE 4?	--respond, "Blue."
HIS TELL US ABOUT THE WATER?	--infer that there must have been oxygen in the water.
OT AS BLUE AS THE OTHER TUBES. WHY?	--indicate that because it is not as blue, there is not as much oxygen present.
THERE WAS OXYGEN IN THE WATER IN S THE WATER IN TUBE 1 THE SAME AS 4 WHEN WE STARTED?	--respond, "Yes," "They were the same."

ACTIVITY
5-26

MATERIALS

TEACHING STRATEGIES

WHERE DID THE OXYGEN GO IN TUBE 1?

WHY IS THE WATER BLUE IN TUBE 2?

WHAT IS IN TUBE 3?

WHAT HAPPENED IN TUBE 3?

WHAT DOES THE BLUE COLOR MEAN?

IF THE SNAIL USES UP OXYGEN, AS WE SAW IN TUBE 1, WHERE WOULD THE OXYGEN COME FROM THAT IS IN THIS TUBE?

Check the predictions made previously and listed on the chalkboard to see how many predictions were correct.

LET'S REVIEW WHAT HAPPENED IN THE TESTS.

WHAT GIVES OFF OXYGEN?

WHAT USES OXYGEN?

WHAT GIVES OFF CARBON DIOXIDE?

WHAT USES CARBON DIOXIDE?

WILL THE SNAIL IN TEST TUBE 1 OR THE ONE IN TEST TUBE 3 LIVE LONGER?

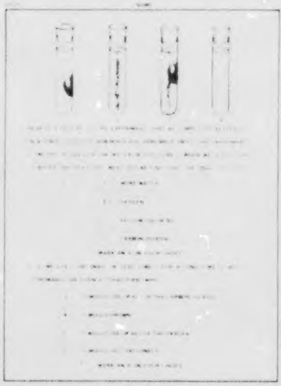
WHICH PLANT WOULD LIVE LONGER, THE ONE IN TEST TUBE 2 OR THE ONE IN TEST TUBE 3?

WHERE DOES OUR OXYGEN COME FROM?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
D THE OXYGEN GO IN TUBE 1?	--infer that the snail must have used it up.
HE WATER BLUE IN TUBE 2?	--infer that there was oxygen present in the water, and that the plant did not use the oxygen.
IN TUBE 3?	--identify the snail and a plant.
PENED IN TUBE 3?	--state that the water in the tube is blue.
S THE BLUE COLOR MEAN?	--state that oxygen is present.
NAIL USES UP OXYGEN, AS WE SAW IN WHERE WOULD THE OXYGEN COME FROM IN THIS TUBE?	--infer that the plant is giving off oxygen.
dictions made previously and listed on the see how many predictions were correct.	
VIEW WHAT HAPPENED IN THE TESTS.	
S OFF OXYGEN?	--indicate that the plant gives off oxygen.
OXYGEN?	--indicate that the snail uses oxygen.
S OFF CARBON DIOXIDE?	--indicate that the snail gives off carbon dioxide.
CARBON DIOXIDE?	--indicate that the plant uses carbon dioxide.
SNAIL IN TEST TUBE 1 OR THE ONE IN 3 LIVE LONGER?	--infer that the snail in Tube 3 will live longer because it will have oxygen from the plant.
NT WOULD LIVE LONGER, THE ONE IN 2 OR THE ONE IN TEST TUBE 3?	--infer that the plant in Tube 3 will live longer because it will have carbon dioxide from the snail.
S OUR OXYGEN COME FROM?	--respond, "Air."

MATERIALS

Worksheet 5-13



TEACHING STRATEGIES

WHERE DOES THE OXYGEN IN THE AIR COME FROM?

IF THERE WERE NO PLANTS ON EARTH, WOULD WE LIVE VERY LONG? WHY?

WHAT IS IN THE AIR WE BREATHE OUT?

WHAT USES UP THAT CARBON DIOXIDE?

Clues to Success:

Part I.

In the Clues to Success Activities 5-2 and 5-10, you assessed your students' ability to follow directions. This Clues to Success activity provides you with another opportunity to assess each student's ability to follow directions. However, this activity focuses on the ability to follow a series of verbal directions.

Before assessing students on their ability to follow directions, turn to Tallysheet 5-6 and rate students as directed.

Distribute Worksheet 5-13 and have each student put his name and the date on the paper. Then say:

> TODAY WE ARE GOING TO SEE WHAT YOU REMEMBER ABOUT THE EXPERIMENT WE COMPLETED YESTERDAY. EVERYONE WILL WORK ALONE AT FIRST. LATER WE WILL TALK TOGETHER ABOUT YOUR ANSWERS.
>
> FIRST WE ARE GOING TO PRACTICE FOLLOWING DIRECTIONS. LOOK AT THE PICTURE OF THE EXPERIMENT AT THE TOP OF YOUR PAPER. I AM GOING TO GIVE YOU A DIRECTION THAT TELLS

TEACHING STRATEGIES

THE OXYGEN IN THE AIR COME FROM?

RE NO PLANTS ON EARTH, WOULD WE
ONG? WHY?

THE AIR WE BREATHE OUT?

P THAT CARBON DIOXIDE?

:

Success Activities 5-2 and 5-10, you
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GOING TO PRACTICE FOLLOWING
LOOK AT THE PICTURE OF THE
T THE TOP OF YOUR PAPER. I AM
E YOU A DIRECTION THAT TELLS

ANTICIPATED STUDENT BEHAVIORS

Students should:

--infer that the plants supply oxygen.

--infer that with no plants there would be no oxygen supply and, therefore, no life.

--respond, "Carbon dioxide."

--infer that plants use carbon dioxide.

MATERIALS

TEACHING STRATEGIES

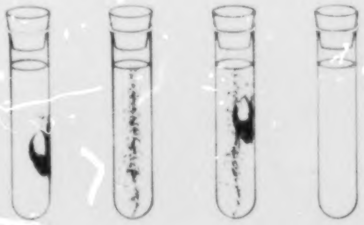
YOU TO DO THREE DIFFERENT THINGS, SO YOU MUST LISTEN VERY CAREFULLY. WAIT UNTIL I HAVE READ THE WHOLE DIRECTION TWICE BEFORE YOU START. I WILL NOT REPEAT THE DIRECTION AFTER YOU START.

READY? (When students are ready, proceed.)

PUT AN X ABOVE EACH TEST TUBE THAT HAS WATER IN IT, CIRCLE EACH TEST TUBE THAT HAS A SNAIL IN IT, AND PUT A CHECK MARK UNDER EACH TEST TUBE THAT HAS A PLANT IN IT.

Repeat the direction once.

Slide 5-50



Part II.

Project Slide 5-50 and point to each tube as you describ its contents. Point out to the students that the pictur at the top of their papers is the same as the one on the slide. Read the description below the picture on the worksheet.

Read each question and each of the choices to the students. Allow ample time for them to mark their worksheets. Repeat each question.

As you read the questions, circulate around the room to see that each student is marking an answer for each question.

After all students have completed their worksheets, collect them. Then read through each question again and discuss each answer. Refer to Slide 5-50 when necessary.

TEACHING STRATEGIES

THREE DIFFERENT THINGS, SO YOU MUST
RY CAREFULLY. WAIT UNTIL I HAVE
WHOLE DIRECTION TWICE BEFORE YOU
WILL NOT REPEAT THE DIRECTION AFTER
.

When students are ready, proceed.)

ABOVE EACH TEST TUBE THAT HAS WATER
RCLE EACH TEST TUBE THAT HAS A SNAIL
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5-50 and point to each tube as you describe
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tudent is marking an answer for each

nts have completed their worksheets,
Then read through each question again
h answer. Refer to Slide 5-50 when

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark or circle D for Question 1.
--mark or circle C for Question 2.
--mark or circle A for Question 3.
--mark or circle B for Question 4.
--mark or circle B for Question 5.

MATERIALS

TEACHING STRATEGIES

After class, tally the students' responses on Tallysheet 5-6. Consider whether the whole class needs further review or if a few individuals need special attention.

See Tallysheet 5-6 for instructions for scoring and recording in the Student Record of Progress.

Group Discussion

Write in large letters on the chalkboard and say to the students:

> "HAVE YOU THANKED A GREEN PLANT TODAY?"

Allow students to discuss what they believe this saying means. Students with an understanding of the interdependence of plants and animals should mention the following:

1. Animals produce carbon dioxide.
2. Plants produce oxygen.
3. Animals need the oxygen that plants produce.
4. Plants need the carbon dioxide that animals produce.
5. We could not live without plants because they help supply us with the oxygen we need to breathe.

This discussion may be used as an informal assessment. Note which students seem to need more work to grasp the concept of interdependence of plants and animals.

TEACHING STRATEGIES

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whether the whole class needs further
few individuals need special attention.

5-6 for instructions for scoring and
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n

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dependence of plants and animals.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have participated in the snail and elodea experiment.*
- *--have observed what happened to each test tube during the oxygen and carbon dioxide tests.*
- *--have completed Worksheet 5-13.*
- *--have participated in a group discussion of the importance of plants to man.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE E
ACTIVITY 5-26

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did you have any trouble obtaining the materials needed for this experiment?
☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

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☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did you have any trouble obtaining the materials needed for this experiment?
☐ Yes ☐ No

13. What problems did you or the students have in conducting this experiment?

14. Were you able to obtain the expected experimental results using the set-up as described in the strategy? ☐ Yes ☐ No Comment.

15. Complete and send Tallysheet 5-6 to BSCS.

Side A

UNIT V, CORE E
ACTIVITY 5-26

Teacher ________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

UNIT V
REACTIONS TO CORE E

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities?
☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

BSCS Evaluation: EMH Feedback Form 2a

Side A

NEW STUDENTS ENTERING DURING THIS C

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Te
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-
American
O = other

W=WIS
B=Bi
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

up	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				

W=WISC
B=Binet
O=Other
(Name)

-
n

for Dropping

Me and my· Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE F. CHANGES IN THE AIR

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

The two parts of this uni
air and water as major compone
Part 1 emphasizes the imp
environment by helping the stu

1. Understand the need for w
2. Recognize the sources of
3. Realize the problems asso
4. Realize the problems asso
5. Recognize the impact of w
6. Understand the broad prob

Part 2 emphasizes the nat
by helping the student to:

7. Understand the compositio
8. Realize that the quality
9. Realize that substances a
10. Comprehend the impact of

1. Establish that air has phy
2. Establish that weather co
3. Establish that local condi
properties of air.

UNIT V GOALS

The two parts of this unit will serve to develop an appreciation of the roles of air and water as major components of our environment.

Part 1 emphasizes the importance of water as a vulnerable component of our environment by helping the student to:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Part 2 emphasizes the nature of air as a complex component of our environment by helping the student to:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

CORE F OBJECTIVES

1. Establish that air has physical properties.
2. Establish that weather conditions are related to the properties of air.
3. Establish that local conditions may be altered by utilizing the physical properties of air.

CORE F RATIONALE

This core is concerned with the physical characteristics of air. Special emphasis is placed upon the density, pressure, and movement of air, and how these features relate to weather. Weather is established as a naturally changing factor in our environment. The student is introduced to some of the properties of air that influence his life and how he in turn may have some influence over local environmental conditions.

BACK

The first activit
establish that air has
pressure (weight per u
relates air pressure t
direct impact on our e
for your background an

In very general t
on the earth. Warm ar
low pressure systems.
result in high pressur
sphere of the earth re
balanced by increased
movement of air from h
of relatively constant
(e.g., polar regions =
In the midlatitudes, t
summer, continental la
are occupied by areas
cooler, underlie high
be reversed. In some
are characterized by t
phenomenon may be evid
hurricanes. In the in
can result in pressure

The last activity
Activities 5-15 and 5-
introduced. Two funda
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environmental

BACKGROUND INFORMATION FOR THE TEACHER

The first activity of this core (Activity 5-27) serves simply to establish that air has weight and occupies space. As such, it exhibits pressure (weight per unit space). The second activity (Activity 5-28) relates air pressure to movement. Air movement, as wind or weather, has direct impact on our environment. The following information is presented for your background and is not intended as information to be taught.

In very general terms, air pressure reflects temperature patterns on the earth. Warm areas, characterized by rising air masses, provide low pressure systems. Colder areas, characterized by denser air masses, result in high pressure systems. Because the total weight of the atmosphere of the earth remains constant, decreased pressure in one area is balanced by increased pressure in another. We recognize the outward movement of air from high pressure to low pressure areas as wind. Areas of relatively constant temperature are characterized by stable air pressure (e.g., polar regions = high pressure; tropic regions = low pressure). In the midlatitudes, temperature patterns reflect seasonal changes. In summer, continental land masses are warmer than the oceans. As such, they are occupied by areas of low pressure. The oceans, being relatively cooler, underlie high pressure systems. In winter the situation may be reversed. In some regions, the periods of reversal (spring or fall) are characterized by the intense air movement we recognize as storms. This phenomenon may be evident toward the edges of continents in the form of hurricanes. In the interior, irregular and localized heating or cooling can result in pressure systems that take the form of tornadoes.

The last activity (Activity 5-29) serves to relate this core to Activities 5-15 and 5-16, in which the process of evaporation was introduced. Two fundamental points are combined: (1) air can incorporate water vapor by evaporation, and (2), since air has substance, its movement has consequence. In this activity, the rate of evaporation from a surface is increased by air movement. The environmental impact is the lowering of the temperature at the evaporating surface.

Me and my Environment

UNIT V
CORE F

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ◀ *in*
be prepared several days or weeks in advance. Use
a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Itali*
5-27. Air Is More than Space	Balloons		Two per s
	Paper clips		Two per s
	A heavy object		Such as a
Days needed: 1		Worksheet 5-14	Pad of 20
		Equal-arm balance kits	One per s
		Tallysheet 5-7	
5-28. Weather and Air	35 mm Slide projector		
Days needed: 2		Chart 5-2, *Water Cycle in Nature*	
		Slide 5-51	Sunny vers
		Slide 5-52	Direct su
		Slide 5-53	Air condit
		Slide 5-54	Smoke blo
		Slide 5-55	Windy day
		Slide 5-56	Foggy day
		Slide 5-57	Wind blow
		Slide 5-58	Weather ma
		Worksheet 5-15	Pad of 20
5-29. Can I Influence Air?	Electric fan		Any size
	Water		
Days needed: 1		Chart 5-2, *Water Cycle in Nature*	
		Thermometers	Two
		Beaker	Any size

PLANNING GUIDE

BSCS

ities (*indicated in italics and an* ➤ *in the margin*) must
d several days or weeks in advance. Use this summary as
and preparation schedule. All supplies needed are listed.

upplies Needed	
Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Two per student group
	Two per student group
	Such as a book, record player, etc.
Worksheet 5-14	Pad of 20 sheets; one worksheet per student
Equal-arm balance kits	One per student group
Tallysheet 5-7	
Chart 5-2, *Water Cycle in Nature*	
Slide 5-51	Sunny versus cloudy area
Slide 5-52	Direct sun versus shade
Slide 5-53	Air conditioner versus no air conditioner
Slide 5-54	Smoke blowing west versus smoke blowing east
Slide 5-55	Windy day versus calm day
Slide 5-56	Foggy day versus clear day
Slide 5-57	Wind blowing from ocean versus blowing from land
Slide 5-58	Weather map
Worksheet 5-15	Pad of 20 sheets; one worksheet per student
	Any size
Chart 5-2, *Water Cycle in Nature*	
Thermometers	Two
Beaker	Any size

BSCS

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air.

8. Realize that the quality of air is variable.

Core F Objectives for the Student:

1. Establish that air has physical properties.

ENVIRONMENTAL THEME:
Interrelationships of Environmental Components

INQUIRY SKILLS:
Inferring

PROBLEM-SOLVING SKILLS:
Drawing Conclusions

PRACTICAL APPLICATION:
Developing the Concept of Weight, Vocabulary Development, Working in a Group

Activity 5-27. Air Is More than Space

This activity will introduce more properties of air. By doing an experiment with balloons, the students will discover that air has weight. This fact will be used later to help explain air pressure. In the following activities, air pressure will be used to help explain weather variations.

IVITY

ls for the Student:
Understand the composition of air.

Realize that the quality of air is
variable.

bjectives for the Student:
Establish that air has physical
properties.

THEME:
ationships of Environmental Components

S:
g

NG SKILLS:
Conclusions

LICATION:
ng the Concept of Weight, Vocabulary
ent, Working in a Group

Is More than Space

introduce more properties of air.
ent with balloons, the students will
as weight. This fact will be used
in air pressure. In the following
ssure will be used to help explain

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE F.	CHANGES IN THE AIR
ACTIVITY 5-27.	AIR IS MORE THAN SPACE

During this activity, __each__ __student__ should:

- *--recall the difference between exhaled and inhaled air.*
- *--attempt to describe air.*
- *--participate in a group to weigh balloons.*
- *--observe that an inflated balloon weighs more than a deflated balloon.*
- *--conclude that air has weight.*

ACTIVITY
5-27

MATERIALS

Worksheet 5-14
Equal-arm balance, 1 kit per student group
*2 Balloons per student group
*2 Paper clips per student group
*A heavy object (book, record player)

*Not furnished in materials kit

TEACHING STRATEGIES

Begin by reviewing the difference between inhaled and exhaled air. Say:

> WE HAVE BEEN TALKING ABOUT AIR AND WHAT IS IN IT. CAN ANYBODY REMEMBER WHAT WE USE MOSTLY IN INHALED AIR?
>
> WHAT DO WE FIND IN OUR EXHALED AIR?
>
> IF YOU HAD TO DESCRIBE AIR TO SOMEONE, WHAT WOULD YOU SAY?
>
> HOW ARE PEOPLE USUALLY DESCRIBED ON A DRIVER'S LICENSE OR IDENTIFICATION CARD?

Write "Name," "Address," "Age," "Height," "Color," and "Weight" on the chalkboard.

> LET'S SEE IF WE COULD DESCRIBE AIR BY USING THESE WORDS.
>
> NAME. WHAT DO WE CALL AIR?
>
> ADDRESS. WHERE COULD WE FIND AIR?
>
> AGE. HOW OLD IS AIR?
>
> HEIGHT. HOW TALL IS AIR?
>
> COLOR. WHAT COLOR IS THE HAIR AND EYES OF AIR?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	During this activity, each student should: *--describe pressure as the force, or pushing of the weight of one thing against something else.* *--successfully complete Worksheet 5-14.*
ewing the difference between inhaled and Say:	Students should:
EEN TALKING ABOUT AIR AND WHAT IS IN IT. DY REMEMBER WHAT WE USE MOSTLY IN IR?	--recall that we use mostly oxygen in inhaled air.
E FIND IN OUR EXHALED AIR?	--recall that there is mostly carbon dioxide in exhaled air.
D TO DESCRIBE AIR TO SOMEONE, WHAT SAY?	--speculate about how they would describe air.
EOPLE USUALLY DESCRIBED ON A DRIVER'S R IDENTIFICATION CARD?	--respond, "Name," "Address," "Age," "Height," "Weight," "Color of hair or eyes."
"Address," "Age," "Height," "Color," and e chalkboard.	
IF WE COULD DESCRIBE AIR BY USING DS.	
AT DO WE CALL AIR?	--respond, "Just air," "Oxygen," "Carbon dioxide."
WHERE COULD WE FIND AIR?	--respond, "All over," "Everywhere."
OLD IS AIR?	--respond, "Really old," "It doesn't have an age."
HOW TALL IS AIR?	--respond, "As tall as the sky," "Really tall," "I don't know."
HAT COLOR IS THE HAIR AND EYES OF AIR?	--respond, "It doesn't have any eyes or hair," "It doesn't have any color."

MATERIALS

TEACHING STRATEGIES

HAS IT BEEN EASY TO DESCRIBE AIR?

WE HAVEN'T TALKED ABOUT WEIGHT YET. HOW MUCH DOES AIR WEIGH?

HOW COULD WE FIND OUT IF AIR HAS ANY WEIGHT?

WHAT DO WE USUALLY USE TO WEIGH THINGS?

WHAT COULD WE USE TO WEIGH AIR?

Hold up a balloon and say:

WHAT DO WE DO WHEN WE BLOW UP A BALLOON?

IF AIR HAD ANY WEIGHT, WOULD THE BALLOON WEIGH LESS, THE SAME, OR MORE THAN IT DID BEFORE WE BLEW IT UP?

LET'S FIND OUT.

NOTE: If necessary, review how to use the equal-arm balance. Refer to Activity 3-11 for specific strategy.

Divide the class into four groups and distribute an equal-arm balance, two balloons, and two paper clips to each group.

DISTRIBUTE

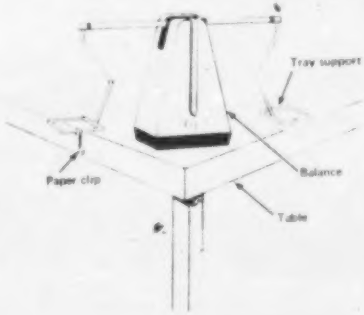
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
EASY TO DESCRIBE AIR?	--indicate that it has not been easy to describe air.
TALKED ABOUT WEIGHT YET. HOW IR WEIGH?	--respond, "Not much," "It doesn't," "I don't know."
E FIND OUT IF AIR HAS ANY WEIGHT?	--respond, "Weigh it."
USUALLY USE TO WEIGH THINGS?	--respond, "A scale," "Our balance."
WE USE TO WEIGH AIR?	--respond, "I don't know," "You can't weigh air."
n and say:	
DO WHEN WE BLOW UP A BALLOON?	--respond, "Put air into it," "Fill it with air."
ANY WEIGHT, WOULD THE BALLOON WEIGH AME, OR MORE THAN IT DID BEFORE WE	--predict whether the balloon would weigh more, less, or the same.
DUT.	
ary, review how to use the equal-arm Refer to Activity 3-11 for specific	
e class into four groups and distribute arm balance, two balloons, and two ps to each group.	

DISTRIBUTE MATERIALS

ACTIVITY
5-27

MATERIALS

Diagram 5-13



TEACHING STRATEGIES

Give the following directions, one at a time, to the students.

1. Remove the trays from both sides of the balance.
2. Open two paper clips so there is a hook on both ends of the clip.
3. Hang one of these paper clips from the tray supports on both ends of the balance. (See Diagram 5-13.)
4. Drape a balloon over each tray support and balance the arms. The balloons should balance perfectly.

5. Remove one balloon and blow it up. Tie the end of the balloon shut.
6. Attach the blown-up balloon to the paper clip that is hanging from the tray support.

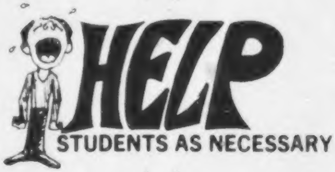
The side of the balance with the inflated balloon should be lower than the side of the balance with the deflated balloon.

When the weighing of the balloons has been completed, ask

DOES AIR HAVE WEIGHT?

HOW DO WE KNOW THAT AIR HAS WEIGHT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
owing directions, one at a time, to the	
the trays from both sides of the balance.	--remove the trays.
o paper clips so there is a hook on both the clip.	--make the paper clip hooks.
e of these paper clips from the tray s on both ends of the balance. (See 5-13.)	--attach the paper clip hooks.
balloon over each tray support and the arms. The balloons should balance ly.	--balance the balloons.



TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
one balloon and blow it up. Tie the end balloon shut.	--blow up one balloon.
he blown-up balloon to the paper clip hanging from the tray support.	--attach the inflated balloon.
e balance with the inflated balloon should the side of the balance with the deflated	
ing of the balloons has been completed, ask:	
HAVE WEIGHT?	--indicate that air has weight.
KNOW THAT AIR HAS WEIGHT?	--respond, "Because the blown-up balloon was lower," "The side with the air went down."

MATERIALS

TEACHING STRATEGIES

IF SOMETHING WEIGHS A LOT AND YOU HAVE TO HOLD IT IN YOUR LAP, WHAT DOES IT FEEL LIKE?

Write "Pressure" on the chalkboard.

THIS IS A WORD WE'RE GOING TO BE USING WHEN WE TALK ABOUT AIR.

WHAT IS PRESSURE?

PRESSURE IS THE FORCE, OR THE PUSHING, OF THE WEIGHT OF ONE THING AGAINST SOMETHING ELSE.

Ask a student to hold out his hand. Set a heavy book on his hand and ask:

(Student's name), DO YOU FEEL ANY PRESSURE?

WHAT PRESSURE DO YOU FEEL?

Set a heavy object on the table.

Then ask:

IS THERE ANY PRESSURE ON THIS TABLE?

WHAT IS PUTTING THE PRESSURE ON THE TABLE?

DOES AIR HAVE WEIGHT?

WOULD AIR HAVE PRESSURE?

Tell a student to stand up next to his desk.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
G WEIGHS A LOT AND YOU HAVE TO HOLD LAP, WHAT DOES IT FEEL LIKE?	--respond, "Heavy," "Like someone pushing down on me," "Not very good."
on the chalkboard.	
RD WE'RE GOING TO BE USING WHEN T AIR.	
SURE?	--guess what pressure means.
THE FORCE, OR THE PUSHING, OF THE E THING AGAINST SOMETHING ELSE.	
hold out his hand. Set a heavy book sk:	
ame), DO YOU FEEL ANY PRESSURE?	--indicate that he feels pressure.
E DO YOU FEEL?	--respond, "The book pushing on my hand."
t on the table.	
PRESSURE ON THIS TABLE?	--indicate that there is pressure on the table.
ING THE PRESSURE ON THE TABLE?	--indicate that the heavy object is exerting pressure on the table.
E WEIGHT?	--recall the balloon-weighing activity and respond, "Yes," "The blown-up balloon was heavier."
VE PRESSURE?	--recall the definition of pressure and infer that because air has weight, it would also have pressure.
stand up next to his desk.	

MATERIALS

TEACHING STRATEGIES

Then ask:

IS THERE ANY PRESSURE ON (student's name) RIGHT NOW?

WHAT IS PUTTING THE PRESSURE ON (student's name)?

Review by asking:

WHAT THINGS DO WE KNOW ABOUT AIR?

GIV
STUDE
TO

The following questions should be asked only to stimulate the students' curiosity and awareness. Do not emphasize or "teach" these ideas, just present them.

HOW MUCH AIR DO YOU THINK IS OVER YOUR HEAD?

HOW MUCH DOES ALL THAT AIR WEIGH?

THERE IS A LOT OF AIR ABOVE OUR HEADS THAT IS PRESSING DOWN ON US.

WHEN YOU DIVE TO THE BOTTOM OF A SWIMMING POOL, YOU CAN FEEL THE PRESSURE OF THE WATER. FISH SWIMMING AT THE BOTTOM OF THE OCEAN DON'T FEEL THAT PRESSURE. WE ARE LIKE THE FISH EXCEPT THAT WE LIVE IN AN OCEAN OF AIR. WE DON'T FEEL THE

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
NY PRESSURE ON (student's name)	--indicate that there is pressure on the student standing.
TTING THE PRESSURE ON (student's name)?	--indicate that the air around him is exerting pressure.
g:	
S DO WE KNOW ABOUT AIR?	--indicate that inhaled air is different from exhaled air, air is formed of oxygen and carbon dioxide, air has weight, and air has pressure.
GIVE SEVERAL STUDENTS A CHANCE TO RESPOND	
estions should be asked only to stimulate riosity and awareness. Do not emphasize ideas, just present them.	
R DO YOU THINK IS OVER YOUR HEAD?	--guess the quantity of air present.
ES ALL THAT AIR WEIGH?	--guess the weight of the air.
LOT OF AIR ABOVE OUR HEADS THAT IS WN ON US.	
VE TO THE BOTTOM OF A SWIMMING POOL, L THE PRESSURE OF THE WATER. FISH THE BOTTOM OF THE OCEAN DON'T FEEL RE. WE ARE LIKE THE FISH EXCEPT THAT AN OCEAN OF AIR. WE DON'T FEEL THE	

MATERIALS

Worksheet 5-14

TEACHING STRATEGIES

PRESSURE OF THE AIR, JUST AS THE FISH DON'T FEEL THE PRESSURE OF THE WATER.

CLUES

Clues to Success:

Distribute Worksheet 5-14. Direct students to put their names and the date at the top of the paper. Read the directions aloud while the students follow along. Assist the students with spelling and reading as necessary.

DISTRIBU

Collect student worksheets. Tallysheet 5-7 will help you summarize student responses to the worksheet. Complete the tallysheet and send it to BSCS with your feedback on this activity.

Turn to the concepts page of the Student Record of Progres and find the column labeled "Act. 5-27, Pressure." Circle YES if the student made correct responses to all eight questions. Circle NO if the student made any incorrect responses.

If, after reviewing and correcting the worksheets, you see that the majority of students have not grasped the concepts introduced in this activity, go back and review this activity. If you see from the worksheet that any one student is having difficulty, review individually with him before proceeding.

TEACHING STRATEGIES

THE AIR, JUST AS THE FISH DON'T FEEL
E OF THE WATER.

CLUES TO SUCCESS

heet 5-14. Direct students to put their
te at the top of the paper. Read the
while the students follow along. Assist
spelling and reading as necessary.

DISTRIBUTE MATERIALS

orksheets. Tallysheet 5-7 will help you
responses to the worksheet. Complete
d send it to BSCS with your feedback on

pts page of the Student Record of Progress
mn labeled "Act. 5-27, Pressure." Circle
t made correct responses to all eight
e NO if the student made any incorrect

ng and correcting the worksheets, you see
of students have not grasped the
ed in this activity, go back and review
f you see from the worksheet that any
ving difficulty, review individually
roceeding.

ANTICIPATED STUDENT BEHAVIORS

Students should:

ACTIVITY
5-27

MATERIALS

TEACHING STRATEGIES

See Change of Pacer 26.

TEACHING STRATEGIES

cer 26.

CHANGE OF PACER

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have helped weigh balloons using an equal-arm balance.
--have observed that an inflated balloon weighs more than a deflated balloon.
--have concluded that air has weight.
--have related the weight of air to pressure.
--have completed Worksheet 5-14.

UNIT V, CORE F
ACTIVITY 5-27

Teacher ____________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes preparing for each day's science class						
4. Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Were the instructions given to students for weighing the balloons sufficiently clear? ☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the instructions given to students for weighing the balloons sufficiently clear? ☐ Yes ☐ No

13. Did students have any problems in using the balance to weigh the balloons?
☐ No ☐ Yes If so, what problems did they have?

14. Do you think students were able to grasp the concept of air pressure? ☐ Yes ☐ No
Comment.

15. Complete and send Tallysheet 5-7 to BSCS.

Side A

UNIT V, CORE F
ACTIVITY 5-27

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

8. Realize that the quality of air is variable.

Core F Objectives for the Student:

1. Establish that air has physical properties.
2. Establish that weather conditions are related to the properties of air.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:

How to Understand a Weather Map, What Changes the Weather

Activity 5-28. Weather and Air

This activity will utilize pictures to help identify factors that influence weather. This is not intended as a detailed study of weather. For many it will be an introduction to weather elements, and for others a review. In Part I students are made aware of the changeable nature of air and identify some of the factors that produce these changes. Part II will relate air pressure, as studied in Activity 5-27, to the highs and lows as seen on weather maps, and how high and low air pressures affect the weather.

TIVITY

als for the Student:
Realize that the quality of air is variable.

Objectives for the Student:
Establish that air has physical properties.

Establish that weather conditions are related to the properties of air.

L THEME:
lationships of Environmental Components

LS:
g

ING SKILLS:
ing, Defending, Answering Why Questions

PLICATION:
Understand a Weather Map, What Changes
ther

eather and Air

utilize pictures to help identify
ence weather. This is not intended
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ather elements, and for others a
students are made aware of the
of air and identify some of the factors
changes. Part II will relate air
ed in Activity 5-27, to the highs and
ather maps, and how high and low
ct the weather.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE F. CHANGES IN THE AIR

ACTIVITY 5-28. WEATHER AND AIR

During this activity, each student should:

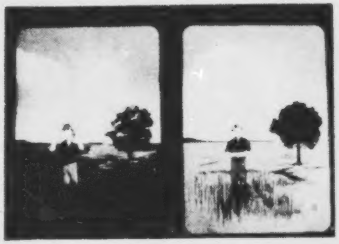
--observe Slides 5-51 through 5-57 and describe what is different in each of the two pictures.
--suggest ways that temperature changes air.
--suggest ways that air can be changed by wind.
--suggest ways that water can change air.
--identify a high pressure system as heavy, descending air that brings good weather.
--identify a low pressure system as light, ascending air that brings bad weather.

ACTIVITY
5-28

MATERIALS

Slides 5-51 through 5-59
Worksheet 5-15
Chart 5-2, *Water Cycle in Nature*
*35 mm Slide projector

Slide 5-51



*Not furnished in materials kit

TEACHING STRATEGIES

Part I.

WHAT HAVE WE LEARNED ABOUT AIR SO FAR?

IS AIR THE SAME ALL THE TIME?

Project Slide 5-51 and say:

THESE SLIDES SHOW THE SAME PLACES AT TWO DIFFERENT TIMES. SOMETHING ABOUT THE AIR HAS CHANGED IN EACH PAIR OF PICTURES. WHAT IS DIFFERENT IN THESE TWO PICTURES?

HOW HAS THE AIR CHANGED?

WHAT MADE THE AIR CHANGE?

HOW DO YOU KNOW IT'S COOLER WHEN THE SUN GOES BEHIND A CLOUD?

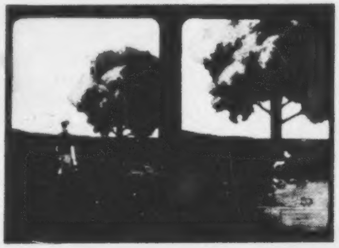
Project Slide 5-52.

WHAT IS DIFFERENT IN THESE PICTURES?

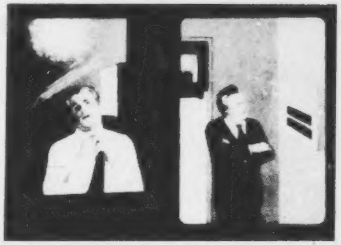
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	During this activity each student should: *--associate the rising air of a low pressure system with the water cycle.* *--complete Worksheet 5-15.*
	Students should:
WE LEARNED ABOUT AIR SO FAR?	--recall that inhaled air is different from exhaled air, air has weight, air is formed of carbon dioxide and oxygen, and air has pressure.
SAME ALL THE TIME?	--speculate on whether air always stays the same.
-51 and say:	
ES SHOW THE SAME PLACES AT TWO TIMES. SOMETHING ABOUT THE AIR D IN EACH PAIR OF PICTURES. WHAT NT IN THESE TWO PICTURES?	--observe and state that the sun has come out from behind the cloud in one picture and the other picture is cloudy.
E AIR CHANGED?	--respond, "It's hotter when the sun is out," "The cloud cooled the air."
THE AIR CHANGE?	--state that the cloud covered the sun and therefore the sun could not heat the air.
KNOW IT'S COOLER WHEN THE SUN GOES LOUD?	--observe the man and state, "The man is not sweating."
-52.	
FFERENT IN THESE PICTURES?	--observe the pictures and state, "The man is in the sun and then in the shade."

MATERIALS

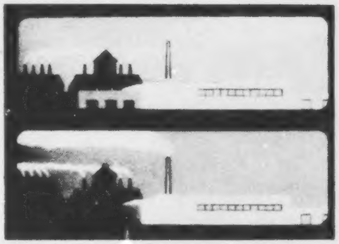
Slide 5-52



Slide 5-53



Slide 5-54



TEACHING STRATEGIES

HOW HAS THE AIR CHANGED?

HOW DO WE KNOW THAT THE AIR UNDER THE TREE IS DIFFERENT FROM THE AIR IN THE OPEN?

WHAT CAUSED THE CHANGE IN THE TEMPERATURE OF THE AIR?

Project Slide 5-53.

HOW IS THE AIR DIFFERENT IN THESE TWO PICTURES?

WHAT CAUSED THE AIR TO CHANGE?

NAME SOME OTHER THINGS THAT MIGHT CHANGE THE TEMPERATURE OF THE AIR.

Discuss the suggested factors.

DISCU

Project Slide 5-54 and ask:

WHAT IS DIFFERENT IN THESE TWO PICTURES?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
AIR CHANGED?	--state that air under the tree is cooler because the sun is blocked.
NOW THAT THE AIR UNDER THE TREE IS ROM THE AIR IN THE OPEN?	--state that the man in the picture is hot in one picture and not in the other.
THE CHANGE IN THE TEMPERATURE OF	--infer that the shade of the trees caused the difference in temperature.
3.	
IR DIFFERENT IN THESE TWO PICTURES?	--observe the pictures and state, "One room is cooler," "The man is cooler in the air-conditioned room."
THE AIR TO CHANGE?	--state that the air conditioner changed the air.
HER THINGS THAT MIGHT CHANGE THE OF THE AIR.	--suggest factors that might influence temperature changes such as shade, clouds, rain, indoors versus outdoors, altitude, wind.
sted factors.	
4 and ask:	
ERENT IN THESE TWO PICTURES?	--observe the pictures and state that the wind is blowing in one picture and not in the other.

DISCUSSION TIME

MATERIALS

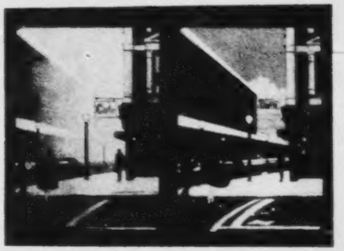
TEACHING STRATEGIES

WHAT IS MOVING THE SMOKE IN THESE PICTURES?

WHAT IS WIND?

If students do not define wind correctly, remin them that wind is merely moving air.

Slide 5-55



Project Slide 5-55 and ask:

WHAT IS DIFFERENT IN THESE TWO PICTURES?

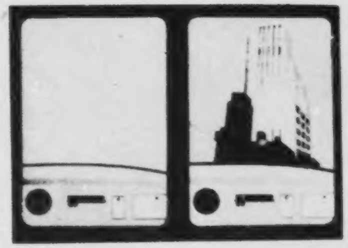
IN WHAT WAYS MIGHT WIND CHANGE THE AIR?

Discuss the suggested ways that wind might change the air.

DISC

If your community is in an area where hurricanes and tornadoes occur, special mention of them might be made here. Discuss what they are, what to do if one comes, what times of the year to expect them, and so forth.

Slide 5-56



Project Slide 5-56 and ask:

HOW ARE THESE TWO PICTURES DIFFERENT?

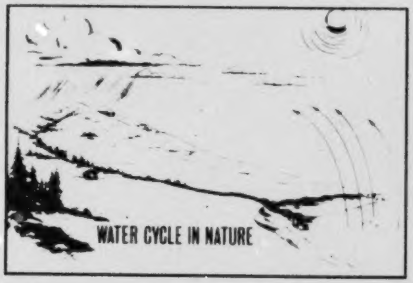
WHAT IS FOG?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
VING THE SMOKE IN THESE PICTURES?	--infer that the wind is moving the smoke.
ND?	--describe wind as moving air.
udents do not define wind correctly, remind that wind is merely moving air.	
-55 and ask:	
FFERENT IN THESE TWO PICTURES?	--observe the pictures and state that the wind is blowing in one picture and not in the other.
YS MIGHT WIND CHANGE THE AIR?	--suggest ways that wind changes the air, such as bringing in cloudy or rainy weather, putting dust into the air, cooling the air, bringing tornadoes or hurricanes and so on.
gested ways that wind might change the	
ty is in an area where hurricanes and , special mention of them might be made what they are, what to do if one comes, ne year to expect them, and so forth.	
-56 and ask:	
ESE TWO PICTURES DIFFERENT?	--observe the pictures and state that it is foggy in one picture and clear in the other.
G?	--respond, "A low cloud," "Water drops," "Water in the air."

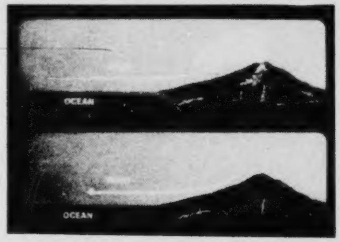
DISCUSSION TIME

MATERIALS

Chart 5-2



Slide 5-57



TEACHING STRATEGIES

Direct the students' attention to the *Water Cycle in Nature* chart and ask:

WHERE DID THE WATER IN THE CLOUDS AND IN THE FOG COME FROM?

Project Slide 5-57 and ask:

WHAT DIFFERENCES DO YOU SEE IN THESE TWO PICTURES?

WHERE IS THE WATER COMING FROM TO MAKE THE CLOUDS AND RAIN IN THE TOP PICTURE?

WHY ARE THERE NO CLOUDS IN THE BOTTOM PICTURE?

IN WHAT WAYS CAN WATER THAT IS IN THE AIR CHANGE AIR?

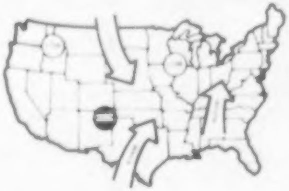
LET'S LIST SOME OF THE THINGS THAT WE HAVE SEEN IN THESE PICTURES THAT BRING ABOUT CHANGES IN THE AIR.

List these factors on the chalkboard. Project the slides again if students do not recall things that produce changes in the air.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ts' attention to the *Water Cycle in* ask:	
E WATER IN THE CLOUDS AND IN THE M?	--recall the water cycle model and state that the water comes from lakes, oceans, and rivers and goes into the air, where it forms clouds and/or fog.
7 and ask:	
NCES DO YOU SEE IN THESE TWO PICTURES?	--observe the pictures and state that the wind is blowing in different directions, and also that one picture has clouds and rain while the other picture has clear skies.
WATER COMING FROM TO MAKE THE AIN IN THE TOP PICTURE?	--recall the water cycle studies and infer that the moisture is coming from the ocean.
E NO CLOUDS IN THE BOTTOM PICTURE?	--infer that there are no clouds because the air has no place to pick up moisture.
CAN WATER THAT IS IN THE AIR CHANGE	--suggest ways that water in the air causes changes in air such as rain, fog, clouds, snow, hail, sleet, ice, and so on.
OME OF THE THINGS THAT WE HAVE SEEN TURES THAT BRING ABOUT CHANGES IN	--recall the pictures and state that the three factors of temperature, movement (wind), and moisture (rain) bring about changes in the air.
s on the chalkboard. Project the slides do not recall things that produce r.	

MATERIALS

Slide 5-58



TEACHING STRATEGIES

Part II.

DOES AIR EVER CHANGE?

CAN WE TELL WHEN IT'S GOING TO CHANGE?

WHAT KINDS OF THINGS DOES A WEATHERMAN TELL YOU IN HIS FORECAST?

Project Slide 5-58.

HAS ANYONE EVER SEEN THESE HIGHS AND LOWS ON A WEATHER MAP?

DOES ANYONE KNOW WHAT THE HIGH AND LOW STAND FOR?

A HIGH ON A WEATHER MAP STANDS FOR HIGH AIR PRESSURE AND LOW STANDS FOR LOW AIR PRESSURE.

WHAT IS AIR PRESSURE?

Assist students as necessary in recalling the definition of air pressure.

WHAT KIND OF AIR WOULD YOU FIND IN A HIGH PRESSURE AREA?

> If students do not relate a high pressure area with heavy air, tell them that if air has a high amount of pressure it must have a lot of weight and be very heavy.

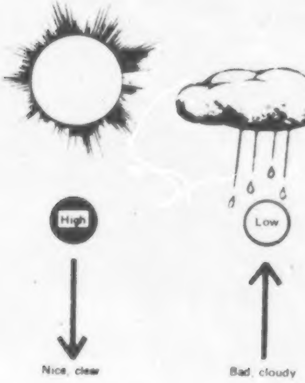
WHAT KIND OF AIR WOULD BE IN A LOW PRESSURE AREA?

HIGH AIR PRESSURE AND LOW AIR PRESSURE HAVE A LOT TO DO WITH OUR WEATHER.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
EVER CHANGE?	--recall Slides 5-51 through 5-57 and respond, "Yes."
L WHEN IT'S GOING TO CHANGE?	--respond, "Yes," "From the weatherman," "Sometimes."
OF THINGS DOES A WEATHERMAN TELL YOU ECAST?	--suggest such things as temperature, wind, rain, storms, and so forth.
-58.	
EVER SEEN THESE HIGHS AND LOWS ON MAP?	--indicate yes or no.
E KNOW WHAT THE HIGH AND LOW STAND FOR?	--speculate what the highs and lows mean.
A WEATHER MAP STANDS FOR HIGH AIR ND LOW STANDS FOR LOW AIR PRESSURE.	
R PRESSURE?	--recall Activity 5-27 and respond, "Weight of the air," "Air pushing on you," "Force of air."
as necessary in recalling the definition .	
OF AIR WOULD YOU FIND IN A HIGH REA?	--respond, "Heavy air," "Air with a lot of force."
udents do not relate a high pressure area heavy air, tell them that if air has a amount of pressure it must have a lot of t and be very heavy.	
OF AIR WOULD BE IN A LOW PRESSURE	--respond, "Light air," "Air that doesn't have much weight."
RESSURE AND LOW AIR PRESSURE HAVE A WITH OUR WEATHER.	

MATERIALS

Diagram 5-14



TEACHING STRATEGIES

WHAT KIND OF WEATHER DO YOU THINK WOULD BE IN A HIGH PRESSURE AREA?

WHAT ABOUT IN A LOW PRESSURE AREA?

LET'S SEE IF WE CAN FIGURE IT OUT.

Write "high" on one side of the chalkboard and "low" on the other side. (See Diagram 5-14.)

Then ask:

WHAT KIND OF AIR IS IN A HIGH PRESSURE AREA?

IF THE AIR IS HEAVY WHERE WOULD IT PROBABLY MOVE?

GIVE S
TIME
TO
THINK

Ask a volunteer to draw an arrow pointing down under the "high" on the chalkboard. (See Diagram 5-14.)

WHAT KIND OF AIR IS IN A LOW PRESSURE SYSTEM?

IF THE AIR IS LIGHT, WHERE WOULD IT PROBABLY MOVE?

GIVE ST
TIME
TO
THINK

Ask a volunteer to draw an arrow pointing up under the "low" on the chalkboard. (See Diagram 5-14.)

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
WEATHER DO YOU THINK WOULD BE ESSURE AREA?	--speculate on the types of weather around a high pressure area, such as good, bad, rainy, clear.
A LOW PRESSURE AREA?	--speculate on the types of weather around a low pressure area such as good, bad, rainy, clear.
WE CAN FIGURE IT OUT.	
e side of the chalkboard and "low" (See Diagram 5-14.)	
AIR IS IN A HIGH PRESSURE AREA?	--respond, "Heavy."
HEAVY WHERE WOULD IT PROBABLY	--infer that heavy air would go down.
GIVE STUDENTS TIME TO THINK	
draw an arrow pointing down under the kboard. (See Diagram 5-14.)	
AIR IS IN A LOW PRESSURE SYSTEM?	--respond, "Light."
LIGHT, WHERE WOULD IT PROBABLY MOVE?	--infer that light air would go up.
GIVE STUDENTS TIME TO THINK	
draw an arrow pointing up under the oard. (See Diagram 5-14.)	

Display Chart 5-2, the *Water Cycle in Nature*, next to th drawing on the chalkboard and ask:

> WHAT IS IN THE AIR OVER OUR LAKES, OCEANS, AND RIVERS?
>
> WHAT CAUSES THE WATER TO GO INTO THE AIR?
>
> WHAT WOULD HAPPEN TO THE LIGHT AIR AS IT GOES UP?
>
> WHAT HAPPENS TO THE AIR HIGH IN THE SKY?
>
> WHAT KIND OF WEATHER MIGHT WE EXPECT IN A LOW PRESSURE AREA?

Ask a volunteer to write "rainy and cloudy" under the "low" on the chalkboard, or draw clouds and rain next to the "low". (See Diagram 5-14.)

> WOULD ANYTHING HAPPEN TO OUR HEAVY AIR AS IT COMES DOWN?
>
> THEN WHAT KIND OF WEATHER MIGHT WE EXPECT IN A HIGH PRESSURE AREA?

Ask a volunteer to write "nice and clear' under the "high" on the chalkboard, or draw a sun next to the "high". (See Diagram 5-14.)

Review again this discussion of the upward and downward movement of air.

TEACHING STRATEGIES	**ANTICIPATED STUDENT BEHAVIORS**
5-2, the *Water Cycle in Nature*, next to the chalkboard and ask:	Students should:
N THE AIR OVER OUR LAKES, OCEANS, AND	--respond, "Water," "Steam."
ES THE WATER TO GO INTO THE AIR?	--recall the water cycle model and state that the sun causes the water to heat and steam or to evaporate.
D HAPPEN TO THE LIGHT AIR AS IT GOES	--observe the *Water Cycle in Nature* chart and state that the air would pick up water.
NS TO THE AIR HIGH IN THE SKY?	--observe the *Water Cycle in Nature* chart and recall the water cycle model and state that the air gets colder and the water drops out of the air as rain.
OF WEATHER MIGHT WE EXPECT IN A LOW AREA?	--infer that rainy or cloudy weather might be expected.
to write "rainy and cloudy" under the alkboard, or draw clouds and rain next (See Diagram 5-14.)	
HING HAPPEN TO OUR HEAVY AIR AS IT ?	--infer that since the moisture in the air is gone, nothing would happen.
KIND OF WEATHER MIGHT WE EXPECT IN SSURE AREA?	--infer that nice, clear weather might be expected.
to write "nice and clear" under the halkboard, or draw a sun next to the iagram 5-14.)	
is discussion of the upward and downward .	

MATERIALS

Worksheet 5-15

Slide 5-59

TEACHING STRATEGIES

Clues to Success:

LET'S SEE IF YOU COULD TELL WHAT THE WEATHER IS GOING TO BE BY LOOKING AT A WEATHER MAP.

Distribute Worksheet 5-15.

Say:

THIS IS A WEATHER MAP LIKE THE ONES YOU MIGHT SEE IN THE NEWSPAPER OR ON TV.

DRAW A SUN BY THE PARTS OF THE UNITED STATES THAT WILL HAVE NICE WEATHER AND A CLOUD OVER THE PARTS THAT WILL HAVE BAD WEATHER.

ONE COMPASS DIRECTION IS ALREADY ON THE MAP. (Point to south.) THERE ARE BLANK SPACES WHERE THE OTHER THREE COMPASS POINTS SHOULD BE. NEXT TO TWO OF THESE BLANKS ARE WRITTEN THE WORD "COAST" BECAUSE THESE ARE THE TWO SEACOASTS OF THE UNITED STATES. WRITE THE CORRECT COMPASS DIRECTION IN EACH OF THE BLANKS.

When students have completed the worksheets, collect them.

Project Slide 5-59 and discuss the position of each high and low and the weather associated with it.

TEACHING STRATEGIES

CLUES TO SUCCESS

YOU COULD TELL WHAT THE WEATHER
E BY LOOKING AT A WEATHER MAP.

et 5-15.

THER MAP LIKE THE ONES YOU
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SE BLANKS ARE WRITTEN THE WORD
SE THESE ARE THE TWO SEACOASTS
STATES. WRITE THE CORRECT COMPASS
EACH OF THE BLANKS.

completed the worksheets, collect them.

and discuss the position of each high
ther associated with it.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--draw a sun next to each high, a cloud next to each low, and write "west" in the left blank, "east" in the right blank, and "north" on the top.

MATERIALS

TEACHING STRATEGIES

If, after reviewing the worksheets, you see that there are students who have not grasped the concepts presented in this activity, review until all students understand that high pressures are associated with good weather and low pressures with bad weather.

Send the student worksheets to BSCS.

If students seem to understand the basic concepts of high and lows, and seem at all interested in the subject it is strongly recommended that you do Change of Pacer 28.

CHAN

See Change of Pacers 27, 28, 29, 30, and 31.

TEACHING STRATEGIES

wing the worksheets, you see that there
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y, review until all students understand
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ith bad weather.

t worksheets to BSCS.

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eem at all interested in the subject it is
ended that you do Change of Pacer 28.

CHANGE OF PACER

acers 27, 28, 29, 30, and 31.

ANTICIPATED STUDENT BEHAVIORS

Students should:

Upon completion of this activity, __each student__ should, as a minimum:

- *--have observed and described Slides 5-51 through 5-58.*
- *--recognize that a high on a weather map means good weather.*
- *--recognize that a low on a weather map means bad weather.*
- *--have completed and discussed Worksheet 5-15.*

UNIT V, CORE F
ACTIVITY 5-28

Teacher ____________

Activity name suggested by class:

BSCS USE: Post ___ Tally ___ Rev ___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Do Slides 5-51 through 5-57 effectively distinguish between different types of weather conditions? ☐ Yes ☐ No Can you suggest any changes?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

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☐ Worthwhile --keep as is
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☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Do Slides 5-51 through 5-57 effectively distinguish between different types of weather conditions? ☐ Yes ☐ No Can you suggest any changes?

13. Were all students successful in identifying the weather conditions associated with high and low pressure areas? ☐ Yes ☐ No If not, note which students were not successful and work with them individually.

14. Send the completed worksheets to BSCS.

UNIT V, CORE F
ACTIVITY 5-28

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.

Core F Objectives for the Student:

2. Establish that weather conditions are related to the properties of air.
3. Establish that local conditions may be altered by utilizing the physical properties of air.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Interpreting Results

PRACTICAL APPLICATION:

How to Keep Cool (or Warm)

Activity 5-29. Can I Influence Air?

This activity is intended to demonstrate the influence of air movement on temperature through its effect on the evaporation of moisture.

TIVITY

als for the Student:

Realize that the quality of air is variable.

Realize that substances are continually added to air.

Objectives for the Student:

Establish that weather conditions are related to the properties of air.

Establish that local conditions may be altered by utilizing the physical properties of air.

L THEME:

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LS:

g

ING SKILLS:

eting Results

PLICATION:

Keep Cool (or Warm)

an I Influence Air?

Intended to demonstrate the influence of emperature through its effect on the isture.

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE F. CHANGES IN THE AIR

ACTIVITY 5-29. CAN I INFLUENCE AIR?

During this activity, each student should:

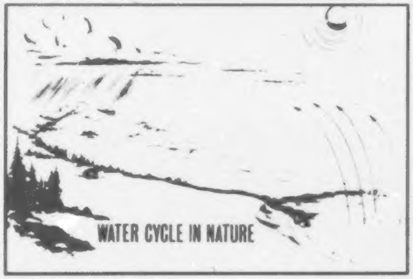
- *--recall ways that air can be changed.*
- *--recall the meaning of evaporation.*
- *--suggest ways water can be cooling on a hot day.*
- *--observe the thermometer/fan demonstration.*

CTIVITY
-29

MATERIALS

Chart 5-2, *Water Cycle in Nature*
2 Thermometers, metal protected
1 Beaker
*1 Electric fan
*Water

Chart 5-2



*Not furnished in materials kit

TEACHING STRATEGIES

Begin this activity by having the students recall the aspects of weather related to air movement discussed in Activity 5-28.

Ask:

> WHAT ARE SOME THINGS THAT CAN CAUSE CHANGES IN THE AIR?
>
> WATER AND WIND ARE TWO THINGS THAT CAUSE CHANGES IN OUR AIR ENVIRONMENT.
>
> HOW COULD YOU USE WATER AND WIND TO CHANGE HOW YOU FEEL ON A HOT SUMMER DAY?
>
> HOW WOULD THESE ACTIVITIES MAKE YOU FEEL?
>
> WHY WOULD WIND HELP YOU FEEL COOLER?
>
> WHY WOULD WATER HELP YOU FEEL COOLER?

Display Chart 5-2, *Water Cycle in Nature*, and ask:

> WHAT IS EVAPORATION?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	During this activity, each student should: --*observe that the thermometer in front of the fan is cooler.* --*infer that moving air speeds evaporation and, therefore, cooling.*
ity by having the students recall the er related to air movement discussed in	Students should:
ME THINGS THAT CAN CAUSE CHANGES IN	--recall that wind, temperature, and moisture can cause changes in the air.
IND ARE TWO THINGS THAT CAUSE CHANGES ENVIRONMENT.	
OU USE WATER AND WIND TO CHANGE HOW A HOT SUMMER DAY?	--suggest such things as fanning yourself, going swimming, riding a bike, putting a wet cloth on your head, etc.
HESE ACTIVITIES MAKE YOU FEEL?	--respond, "Make you feel cooler," "More comfortable," "Better."
IND HELP YOU FEEL COOLER?	--respond, "The air is moving," "Blows cool air onto your face," "Moves the hot air away."
ATER HELP YOU FEEL COOLER?	--respond, "Because it's cold," "It just does," "I don't know."
2, *Water Cycle in Nature*, and ask:	
PORATION?	--recall Activity 5-16 and respond, "Water going into the air."

MATERIALS

TEACHING STRATEGIES

GIVE S
TIME
TO
THINK

HE
STUDENTS

WHEN WATER EVAPORATES DOES IT CHANGE THE ENVIRONMENT IN ANY WAY?

If students have difficulty recalling, project Slides 5-56 (fog) and 5-57 (wind over water).

WHEN WATER EVAPORATES FROM SOMEWHERE IT COOLS THAT PLACE. IF YOU HAVE WATER ON YOUR BODY AND THAT WATER EVAPORATES YOU FEEL COOLER. IF THERE IS WATER ON THE SIDEWALK, THE SIDEWALK WILL FEEL COOLER BECAUSE THE WATER ON IT IS EVAPORATING.

WE'VE SAID WIND CAN ALSO COOL YOU. IF WE PUT WIND AND WATER TOGETHER WOULD THEY COOL YOU TWICE AS MUCH?

HOW COULD WE FIND OUT?

Discuss the students' suggestions and then select six students to assist you in setting up the following experiment. Each student will do one of the following tasks:

TEACHING STRATEGIES

EVAPORATES DOES IT CHANGE THE
IN ANY WAY?

difficulty recalling, project Slides
-57 (wind over water).

EVAPORATES FROM SOMEWHERE IT COOLS
IF YOU HAVE WATER ON YOUR BODY
ER EVAPORATES YOU FEEL COOLER.
WATER ON THE SIDEWALK, THE SIDEWALK
OLER BECAUSE THE WATER ON IT IS

IND CAN ALSO COOL YOU. IF WE
WATER TOGETHER WOULD THEY COOL
MUCH?

FIND OUT?

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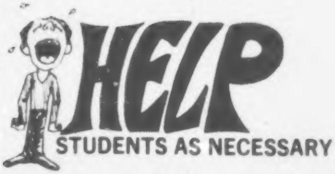
t you in setting up the following
student will do one of the following

GIVE STUDENTS
TIME
TO
THINK



ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
5-29
tr

Students should:

--recall the discussion in Activity 5-28 and suggest ways that moisture may change air such as rain, cooler temperature, fog, cloud, etc.

--speculate about what would happen.

--suggest ways to find out if wind and water cool twice as much.

MATERIALS

TEACHING STRATEGIES

1. Set out two thermometers.
2. Fill a beaker with water and set the thermometers in the water.
3. Wait a few minutes and read the temperature on both thermometers and record them on the chalkboard.
4. Set a fan nearby and turn it on.
5. Take one thermometer out of the water and hold it in front of the fan.
6. Quickly read the temperature of that thermometer and record it on the chalkboard.

Then ask:

IS THERE ANY DIFFERENCE IN OUR THERMOMETER READINGS?

WHAT WAS THE DIFFERENCE BETWEEN THE THERMOMETER THAT READ LOWER AND THE ONE THAT READ HIGHER?

WHAT CAUSED THE THERMOMETER OUT OF THE WATER TO COOL?

WHAT WAS THE FAN DOING TO COOL THE THERMOMETER?

THERE WAS WATER ON BOTH THERMOMETERS. WHAT WAS HAPPENING TO THE WATER ON THE THERMOMETER THAT WAS OUT OF THE WATER?

WAS THE WATER ON THE THERMOMETER IN THE BEAKER EVAPORATING?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
o thermometers.	--set out the thermometers.
ker with water and set the thermometers ter.	--fill the beaker and set the thermometer in the beaker.
minutes and read the temperature on ometers and record them on the chalkboard.	--read and record the temperatures.
nearby and turn it on.	--turn on the fan.
hermometer out of the water and hold it f the fan.	--hold the thermometer in front of the fan.
ad the temperature of that thermometer it on the chalkboard.	--read and record the temperature.
Y DIFFERENCE IN OUR THERMOMETER	--respond, "Yes," "They're different," "The one in front of the fan is lower."
E DIFFERENCE BETWEEN THE THERMOMETER OWER AND THE ONE THAT READ HIGHER?	--respond, "One was in the water and one was not."
THE THERMOMETER OUT OF THE WATER TO	--respond, "The wind," "The fan," "Moving air around it."
E FAN DOING TO COOL THE THERMOMETER?	--respond, "Helping to cool it down," "Pushing air toward it."
ATER ON BOTH THERMOMETERS. WHAT WAS O THE WATER ON THE THERMOMETER THAT THE WATER?	--respond, "Going into the air," "Evaporating."
ER ON THE THERMOMETER IN THE BEAKER ?	--respond, "No," "Not as much."

MATERIALS	TEACHING STRATEGIES
	IF EVAPORATION COOLS THINGS ANYWAY, WHAT DID THE FAN DO? Do the demonstration once again to re-emphasize the points discussed. Use different student assistants this time to involve as many students as possible. Then ask: HOW DO YOU FEEL WHEN YOU COME OUT OF A SWIMMING POOL ON A WINDY DAY? HOW DO YOU FEEL ON A COLD, WINTER DAY WHEN IT'S VERY WINDY? WHAT DO WIND IN THE AIR AND WATER IN THE AIR HAVE IN COMMON? HOW DO THEY WORK TOGETHER?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ION COOLS THINGS ANYWAY, WHAT DID THE	--infer that the moving air hurried the evaporation process and cooled the thermometer more quickly than it otherwise would.
tion once again to re-emphasize the . Use different student assistants olve as many students as possible.	
FEEL WHEN YOU COME OUT OF A SWIMMING INDY DAY?	--respond, "Cold," "Chilly."
FEEL ON A COLD, WINTER DAY WHEN IT'S	--respond, "Colder," "Really cold."
D IN THE AIR AND WATER IN THE AIR ION?	--respond, "They both cool things down," "They both change the air."
WORK TOGETHER?	--infer that wind speeds the evaporation process and cools things rapidly.
	Upon completion of this activity, each student should, as a minimum: *--have observed the thermometer/fan demonstration.* *--be able to relate water and wind to keeping cool*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE F
ACTIVITY 5-29

Teacher ____________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes preparing for each day's science class						
4. Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Were students able to recall the things which can cause changes in the air?
☐ Yes ☐ No

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

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If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were students able to recall the things which can cause changes in the air?
☐ Yes ☐ No

13. Was the experiment successful in demonstrating that air speeds evaporation and therefore cooling? ☐ Yes ☐ No

UNIT V, CORE F
ACTIVITY 5-29

Teacher ______________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

UNIT V
REACTIONS TO CORE F

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core? ☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

BSCS Evaluation: EMH Feedback F

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

BSCS Evaluation: EMH Feedback Form 2a

Side A

NEW STUDENTS ENTERING DURING THIS C

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Te
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-American
O = other

W=WIS
B=Bir
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				
	M F			W B O				

W=WISC
B=Binet
O=Other
(Name)

for Dropping

Me and my·
Environment

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE G. ADDITIVES IN OUR AIR

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

The two parts of this unit w
air and water as major components
Part 1 emphasizes the import
environment by helping the studen

1. Understand the need for wate
2. Recognize the sources of wat
3. Realize the problems associat
4. Realize the problems associat
5. Recognize the impact of wate
6. Understand the broad problems

Part 2 emphasizes the nature
by helping the student to:

7. Understand the composition o
8. Realize that the quality of a
9. Realize that substances are c
10. Comprehend the impact of air

CO

1. Establish that substances are
2. Establish that an additive ne
3. Establish that some things ad

NIT V. AIR AND WATER IN MY ENVIRONMENT

ORE G. ADDITIVES IN OUR AIR

BSCS

UNIT V GOALS

The two parts of this unit will serve to develop an appreciation of the roles of air and water as major components of our environment.

Part 1 emphasizes the importance of water as a vulnerable component of our environment by helping the student to:

1. Understand the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.

Part 2 emphasizes the nature of air as a complex component of our environment by helping the student to:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

CORE G OBJECTIVES

1. Establish that substances are added to natural air because of man's activities.
2. Establish that an additive need not be seen to be present.
3. Establish that some things added to air are harmful to living things.

CORE G RATIONALE

At this point, air has been established as an important environmental component. The most important features of natural air have already been examined. This core will serve to demonstrate that air is also susceptible to changes in quality because of additives resulting from human activity. Two general classes of additives (visible and invisible) are examined in specific activities. The student will relate the increase of such additives to the increase in human activity.

B

Modern socie
suspended as smok
least when concen
to be invisible,
we recognize by o
that just because
free of harmful a
is a classic exam

The most com
5-33) involve col
of auto exhausts.
supervised carefu
be instructed not
time and to move
been collected.

In Activity
quite simple. Th
solution with a h
the test solution
is directly relat
actual measuremen
required to achie
fewer strokes tha
less concentrated
reach the end poi

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE G. ADDITIVES IN OUR AIR

BSCS

ortant environmental
have already been
r is also susceptible
rom human activity.
e) are examined in
ease of such additives

BACKGROUND INFORMATION FOR THE TEACHER

Modern society deposits many things into the air. Particles suspended as smoke, fumes, sprays, and dusts tend to be visible -- at least when concentrated near the source. Most gases or vapors tend to be invisible, even at the source. Many of these invisible additives we recognize by odor. It is very important that the students understand that just because air is colorless and odorless, it is *not* necessarily free of harmful additives. Carbon *monoxide*, a product of auto exhaust, is a classic example of an odorless, tasteless, invisible poison!

The most complicated activities in this core (Activities 5-32 and 5-33) involve collecting and detecting some of the invisible components of auto exhausts. Naturally it is extremely important that students be supervised carefully during the collection of the emissions. They should be instructed not to stand in the direct stream of exhaust fumes at any time and to move away from the immediate area as soon as the sample has been collected.

In Activity 5-33, the mechanical aspects of the pollution test are quite simple. The air to be tested is drawn through an indicator (test) solution with a hand vacuum pump. The additive (pollutant) reacts with the test solution resulting in a color change. The rate of this change is directly related to the concentration of the additive in the air. The actual measurement is made in terms of the number of strokes of the pump required to achieve the color change. The *more* pollutant there is, the *fewer* strokes that will be required to develop the color change. The *less* concentrated the pollutant, the *more* strokes will be required to reach the end point.

Me and my· Environment

UNIT V
CORE G

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in* be prepared several days or weeks in advance. Use a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	*(Italic*
5-30. What Do We Put in Our Air?	Bulletin board Pins		For making
Days needed: 2			
5-31. What Is in Our Air?	35 mm Slide projector		
		Microscopes	Four
		Slide 5-60	City smog
Days needed: 2		Slide 5-61	Small town
		Slide 5-62	Rural scene
		Slide 5-63	Worksheet 5
		Slide 5-64	Worksheet 5
		Worksheet 5-16	Clue to Suc
	3 X 5 Index cards		About twent
	Transparent tape		Several rol
	Scissors		One per stu
5-32. Altered Air and Life	Car		
	One-quart jars with lids		*Two per pai*
	Paper		
Days needed: 2+	Pencil		
	Glass jars with lids		*At least fi*
	At least five of the		
	following substances:		*One drop of*
	Vinegar		
	Turpentine		
	Gasoline		
	Kerosene		

PLANNING GUIDE

ivities *(indicated in italics and an* ➤ *in the margin)* must
ed several days or weeks in advance. Use this summary as
g and preparation schedule. All supplies needed are listed.

BSCS

upplies Needed Materials in Supply Kit	Notes and Suggestions to Teacher *(Italics and Arrow Indicate Advance Preparation Directions)*
	For making a class bulletin board display
Microscopes	Four
Slide 5-60	City smog
Slide 5-61	Small town
Slide 5-62	Rural scene
Slide 5-63	Worksheet 5-16A
Slide 5-64	Worksheet 5-16B
Worksheet 5-16	Clue to Success - one worksheet per student
	About twenty
	Several rolls
	One per student
	Two per pair of students
	At least five, any size
	One drop of each of the five you pick

Me and my Environment

UNIT V
CORE G

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ❧ *i*
be prepared several days or weeks in advance. Us
a teaching and preparation schedule. All supplie

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	*(Ita*
5-32. Altered Air and Life (continued)	Glue		
	Perfume		
	Aftershave		
	Air freshener		
	Deodorant		
	Ammonia		
	Bulletin board display		From Act
	Cassette tape recorder		
	Blank tapes		
	Picture of car		
	Masking tape		
		Bean seeds	*Two per* *activi*
5-33. Do We Need a Filter on Our Town? Days needed: 2	35 mm Slide projector		
	Distilled water		About one
	Chalk		Two piec
	Ruler or yardstick		Two
	Bottle of rinse water		Tap wate
	Paper towels		To wipe w
		Slide 5-65	Workshee
		Worksheet 5-17	Pad of 2
		Water pipe with an extra vial	One per g
		Solid cap for water pipe	One per g
		Mityvac hand pump	One per g
		Vinyl tubing, 1/4-inch inside diameter	Two twelv
		Broad range indicator solution, Hach Chem. #443	One dropp
		Large beakers	To carry

PLANNING GUIDE

tivities *(indicated in italics and an ➤ in the margin)* must
ared several days or weeks in advance. Use this summary as
ing and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed Materials in Supply Kit	Notes and Suggestions to Teacher *(Italics and Arrow Indicate Advance Preparation Directions)*
	From Activity 5-29
Bean seeds	*Two per pair of students. Plant seeds four to six days before activity begins. A two-to three-inch sprout will be needed.*
	About one pint
	Two pieces
	Two
	Tap water, about one pint
	To wipe water pipe after it is rinsed
Slide 5-65	Worksheet 5-17
Worksheet 5-17	Pad of 20 sheets; one worksheet per student
Water pipe with an extra vial	One per group of students
Solid cap for water pipe	One per group of students
Mityvac hand pump	One per group of students
Vinyl tubing, 1/4-inch inside diameter	Two twelve-inch pieces per pair of students
Broad range indicator solution, Hach Chem. #443	One dropping bottle per pair of students
Large beakers	To carry equipment outside

Me and my Environment

UNIT V
CORE G

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in*
be prepared several days or weeks in advance. Use
a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Itali*
5-34. Clues to Success: Understanding Days needed: 1	35 mm Slide projector Huge box Variety of art materials Cassette tape recorder(s) Blank tape(s)	Worksheet 5-18A, B, C, D, E Sub Unit Assessment 2, Air in the Environment Slide 5-66 Slide 5-67 Slide 5-68 Slide 5-69 Slide 5-70	Refrigerat For TV pro For audio One worksh Of Workshe Of Workshe Of Workshe Of Workshe Of Workshe
5-35. What Do You Think? Days needed: 3+		Slides 5-71, 5-72 Slides 5-73, 5-74 Slides 5-75, 5-76 Slides 5-77, 5-78 Slide 5-79 Slides 5-29 through 5-34 Tallysheet 5-10 Chart 5-2, *Water Cycle in Nature*	Worksheet Worksheet Worksheet Worksheet Worksheet Part II di

PLANNING GUIDE

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red several days or weeks in advance. Use this summary as
ng and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Refrigerator size, or student-made box
	For TV production
	For audio part of TV production
Worksheet 5-18A, B, C, D, E Sub Unit Assessment 2, Air in the Environment	One worksheet per student
Slide 5-66	Of Worksheet 5-18A
Slide 5-67	Of Worksheet 5-18B
Slide 5-68	Of Worksheet 5-18C
Slide 5-69	Of Worksheet 5-18D
Slide 5-70	Of Worksheet 5-18E
Slides 5-71, 5-72	Worksheet 5-19
Slides 5-73, 5-74	Worksheet 5-20
Slides 5-75, 5-76	Worksheet 5-21
Slides 5-77, 5-78	Worksheet 5-22
Slide 5-79	Worksheet 5-23
Slides 5-29 through 5-34	Part II discussion
Tallysheet 5-10	
Chart 5-2, *Water Cycle in Nature*	

BSCS

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

8. Realize that the quality of air is variable.

9. Realize that substances are continually added to air.

Core G Objectives for the Student:

1. Establish that substances are added to natural air because of man's activities.

ENVIRONMENTAL THEME:
Ecological Trade-offs

INQUIRY SKILLS:
Divergent Production

PROBLEM-SOLVING SKILLS:
Discussion and Treatment of Group Data -- Comparing Results

PRACTICAL APPLICATION:
Communicating to a Group

Activity 5-30. What Do We Put in Our Air?

This activity will utilize information collected by the students related to how man adds things to the air. It is meant to be an open-ended activity to learn how many sources of air pollution the students can discover. The activity may be a continuing class project concerned with the concept of air pollution. The information collected

ACTIVITY

Goals for the Student:
8. Realize that the quality of air is variable.

9. Realize that substances are continually added to air.

G Objectives for the Student:
1. Establish that substances are added to natural air because of man's activities.

TAL THEME:
gical Trade-offs

ILLS:
gent Production

LVING SKILLS:
ssion and Treatment of Group Data --
ting Results

APPLICATION:
nicating to a Group

What Do We Put in Our Air?

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BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE G. ADDITIVES IN OUR AIR

ACTIVITY 5-30. WHAT DO WE PUT IN OUR AIR?

During this activity, each student should:

- *--collect items that prove man adds things to the air.*
- *--identify what is being added to the air and where it is coming from.*
- *--participate in making a bulletin board display of items brought into class.*

MATERIALS

TEACHING STRATEGIES

for this activity will be expanded and reviewed in Activity 5-32 of this core, and at that time the consequences of air pollution will be emphasized.

Begin by saying:

> WHAT ARE SOME THINGS THAT CAN CHANGE AIR?
>
> THOSE ARE NATURAL CHANGES IN THE AIR.
>
> DOES MAN CHANGE AIR IN ANY WAY? DOES HE PUT THINGS IN THE AIR THAT DON'T BELONG THERE AND THAT ARE OUT OF PLACE?

At this time tell the students that their job will be to find and bring to class something that shows that ma puts things in to the air. Tell them they can find pictures in magazines and newspapers that show this. They can draw pictures, write descriptions, use the camera, or use any ideas of their own. Remind the students that for each item brought to class, they must be able to explain what is being put into the air, and where it is coming from.

**ENCO
CREA
IDE**

Allow the students as much time as necessary to collect their proof that man puts things into the air.

In the next science class period ask each student to display and explain his item. Accept any logical idea.

TEACHING STRATEGIES

ity will be expanded and reviewed in of this core, and at that time the f air pollution will be emphasized.

g:

SOME THINGS THAT CAN CHANGE AIR?

NATURAL CHANGES IN THE AIR.

CHANGE AIR IN ANY WAY? DOES HE PUT THE AIR THAT DON'T BELONG THERE AND OUT OF PLACE?

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ENCOURAGE CREATIVE IDEAS

ents as much time as necessary to collect at man puts things into the air.

ence class period ask each student to plain his item. Accept any logical idea.

ALLOW SOME HUMOR HERE

ANTICIPATED STUDENT BEHAVIORS

Students should:

--list wind, water, and temperature as some ways air can be changed.

--speculate whether man changes air.

MATERIALS

TEACHING STRATEGIES

When all the students have completed their explanations, ask them to create a bulletin board display of the clippings, photos, drawings, and other items brought to class. These items will be discussed and utilized again later in Activity 5-32.

The drawings, photos, or pictures that the students bring to class might have one of the themes suggested below:

Bus or auto exhaust
Smoke from chimneys (home, factory)
Garbage burning
Leaves burning
Dust
Pesticide sprays
Aerosal sprays (air freshener, hair spray, etc.)
Lawn sprinkler
Airplane exhaust
Clothes dryer
Campfires
Fumes from gasoline and paint cans
Tobacco smoke

Some advanced students might even suggest that humans and plants put something into the air -- carbon dioxide and oxygen!

TEACHING STRATEGIES

dents have completed their explanations, te a bulletin board display of the s, drawings, and other items brought to ems will be discussed and utilized ctivity 5-32.

otos, or pictures that the students ight have one of the themes suggested

exhaust
chimneys (home, factory)
ning
ing

prays
ays (air freshener, hair spray, etc.)
ler
naust
er

gasoline and paint cans
ke

dents might even suggest that humans and ing into the air -- carbon dioxide and

ANTICIPATED STUDENT BEHAVIORS

Students should:

Upon completion of this activity, each student should, as a minimum:

--have collected two or three items that show man adds things to the air.

ACTIVITY
5-30

MATERIALS	TEACHING STRATEGIES
	See Change of Pacers 32 and 33.

CHAN

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

CHANGE OF PACER

Pacers 32 and 33.

UNIT V, CORE G
ACTIVITY 5-30

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐No ☐Yes Obtained by you? ☐No ☐Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐No ☐Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐Yes ☐No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐Yes ☐No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐Worthwhile --keep as is ☐Of value--needs the revision suggested ☐Worth salvaging--make major changes described ☐Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Please make a list of things which students suggest that man puts into the air and send the list to BSCS.

13. Were all students able to suggest some things

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Please make a list of things which students suggest that man puts into the air and send the list to BSCS.

13. Were all students able to suggest some things which man puts into the air?
☐ Yes ☐ No

14. If possible, send a picture of the bulletin board the students constructed.

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UNIT V, CORE G
ACTIVITY 5-30

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually being added to air.

Core G Objectives for the Student:

1. Establish that substances are added to natural air because of man's activities.

ENVIRONMENTAL THEME:
Population Dynamics

INQUIRY SKILLS:
Describing

PROBLEM-SOLVING SKILLS:
Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:
How to Keep the Air Clean, Practice in Grouping, Seriation, Describing Things

Activity 5-31. What Is in Our Air?

This activity will serve to introduce visible suspended particles in the air as a component of air. A demonstration will be based on the scattering of airborne

VITY

s for the Student:
Understand the composition of air.

Realize that the quality of air is variable.

Realize that substances are continually being added to air.

jectives for the Student:
Establish that substances are added to natural air because of man's activities.

THEME:
n Dynamics

:
g

G SKILLS:
g, Defending, Answering Why

ICATION:
ep the Air Clean, Practice in
Seriation, Describing Things

t Is in Our Air?

serve to introduce visible suspended r as a component of air. A demon- sed on the scattering of airborne

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BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE G. ADDITIVES IN OUR AIR

ACTIVITY 5-31. WHAT IS IN OUR AIR?

During this activity, *__each__* *__student__* *should:*

--observe and discuss Slides 5-60 through 5-64.
--observe dust particles in the classroom air.
--prepare several air collecting cards.

MATERIALS

TEACHING STRATEGIES

dust in light, after which students will collect air samples and examine them under the microscope. This activity will relate the amount of such dust directly to the degree of local human activity.

Microscopes, 4
Slides 5-60 through 5-64
Worksheet 5-16
*35 mm Slide projector
*3 X 5 Index cards (about 20)
*Transparent tape
*Scissors

Begin by referring to the collection of examples from Activity 5-30 that show additions to the air. Discuss some of the common features of these examples by asking

HOW ARE SOME OF THESE ADDITIONS TO THE AIR ALIKE?

Then ask:

WHAT IS THE AIR LIKE WHERE THE ADDITIONS ARE PUT INTO THE AIR?

WHAT HAPPENS AFTER THESE ADDITIONS ARE PUT INTO THE AIR?

Slide 5-60

Project Slide 5-60 (city smog). Then ask:

WHY IS ALL THIS STUFF IN THE AIR?

WHY IS THERE SO MUCH STUFF IN THE AIR IN THIS CITY?

Project Slide 5-61 (town), and ask:

HOW IS THIS PICTURE DIFFERENT FROM THE LAST?

*Not furnished in materials kit

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
, after which students will collect air xamine them under the microscope. This relate the amount of such dust directly of local human activity.	*During this activity, each student should:* *--examine the tape on the collecting cards before and after they have been set out.* *--compare the air in the classroom to the air in a city.* *--suggest ways that air pollution might bother people.* *--suggest ways that air pollution might be reduced.* *--complete and discuss Worksheet 5-16.*
rring to the collection of examples from that show additions to the air. Discuss ommon features of these examples by asking:	Students should:
SOME OF THESE ADDITIONS TO THE AIR ALIKE?	--observe that many are dark, light, bright, dull, and so forth.
THE AIR LIKE WHERE THE ADDITIONS ARE PUT AIR?	--respond, "It's smoky," "It's thick," "It's smoggy."
PENS AFTER THESE ADDITIONS ARE PUT INTO	--respond, "They go up," "They spread out," "They disappear."
5-60 (city smog). Then ask:	
LL THIS STUFF IN THE AIR?	--recall Activity 5-30 and respond, "Because people put it in," "Because a lot of cars and factories put stuff in the air."
HERE SO MUCH STUFF IN THE AIR IN Y?	--infer that because a city has many people there will be many additives in the air.
5-61 (town), and ask:	
HIS PICTURE DIFFERENT FROM THE LAST?	--respond, "Less smoke," "Less smog," "Less stuff in the air."

MATERIALS

Slide 5-61

Slide 5-62

TEACHING STRATEGIES

WHY DOES THERE SEEM TO BE LESS STUFF IN THE AIR?

Project Slide 5-62 (rural scene), and ask:

HOW IS THIS SLIDE DIFFERENT FROM THE LAST?

WHY DO YOU SUPPOSE THERE IS LESS STUFF IN THE AIR HERE?

HOW GOOD IS THE AIR WE HAVE IN OUR COMMUNITY?

WHY IS THE AIR THIS WAY?

WHAT DO YOU THINK ABOUT THE AIR IN THIS ROOM?

LET'S LOOK IN THIS ROOM TO SEE HOW MUCH STUFF IS IN THE AIR.

Darken the room and turn on the slide projector without a slide in place.

Dust particles should be easily visible in the light of the projector. As soon as the students have observed the dust particles in the beam of light, ask:

WHAT DO YOU THINK ABOUT THE AIR IN THIS ROOM?

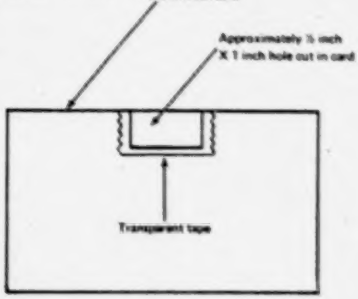
HOW DOES IT COMPARE WITH THE PICTURE OF THE AIR IN THE LARGE CITY?

IN WHICH PLACE WOULD YOU RATHER LIVE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ERE SEEM TO BE LESS STUFF IN THE AIR?	--respond, "There are fewer people," "There are not as many cars."
2 (rural scene), and ask:	
SLIDE DIFFERENT FROM THE LAST?	--respond, "Clean air," "No smog."
UPPOSE THERE IS LESS STUFF IN THE	--respond, "No factories," "Fewer people," "Fewer cars."
THE AIR WE HAVE IN OUR COMMUNITY?	--respond variously, "Smoggy," to "Clean."
IR THIS WAY?	--respond, "Lots of people," to "Not so many people." (Responses will depend upon the local situation.)
THINK ABOUT THE AIR IN THIS ROOM?	--respond, "It's clean," "We have no dust," "No cars."
N THIS ROOM TO SEE HOW MUCH STUFF R.	
nd turn on the slide projector without	
ould be easily visible in the light of s soon as the students have observed s in the beam of light, ask:	
THINK ABOUT THE AIR IN THIS ROOM?	--respond, "There's dust in our air," "It's not as clean as I thought."
COMPARE WITH THE PICTURE OF THE ARGE CITY?	--indicate that the city had many more additives in its air than the classroom.
CE WOULD YOU RATHER LIVE?	--indicate their preferences, probably stating that the relatively clean air of the smaller town would make it a better place to live.

MATERIALS

Diagram 5-17



TEACHING STRATEGIES

HOW COULD WE FIND OUT WHAT IS IN THE AIR IN OTHER PLACES?

CAN WE ALWAYS SEE JUST BY LOOKING AT THE AIR WHAT IS IN IT?

WHAT HAVE WE USED TO LOOK AT THINGS WE CAN'T SEE WITH JUST OUR EYES?

WE ARE GOING TO COLLECT SOME AIR SAMPLES AND LOOK AT THEM WITH THE MICROSCOPE TO SEE IF THERE IS ANYTHING IN THAT AIR.

WHAT ARE SOME GOOD PLACES TO COLLECT AIR SAMPLES?

Write the suggestions on the chalkboard.

Divide the students into four groups. Distribute four 3 X 5 index cards, transparent tape, and scissors to each group. Tell each group to choose four of the places suggested and written on the chalkboard from which to collect air samples. Direct them to write the name of one place on each of their cards and also to put their own names on the cards. Instruct them to make their air collecting cards by following these directions:

1. On the long side of each card, cut a square approximately one inch down, one inch across, and one inch up. (See Diagram 5-17.)

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
WE FIND OUT WHAT IS IN THE AIR PLACES?	--suggest such things as using the slide projector, looking at the air, and so forth.
WAYS SEE JUST BY LOOKING AT THE IS IN IT?	--respond, "No, we need to use something to help us look."
WE USED TO LOOK AT THINGS WE WITH JUST OUR EYES?	--respond, "The microscope."
ING TO COLLECT SOME AIR SAMPLES AT THEM WITH THE MICROSCOPE TO ERE IS ANYTHING IN THAT AIR.	
SOME GOOD PLACES TO COLLECT AIR	--suggest such places as outside, another classroom, air vents, parking lot, near a window, and so forth.
estions on the chalkboard.	
dents into four groups. Distribute four rds, transparent tape, and scissors to ell each group to choose four of the ed and written on the chalkboard from ct air samples. Direct them to write the ace on each of their cards and also to names on the cards. Instruct them to collecting cards by following these	
ong side of each card, cut a square ately one inch down, one inch across, inch up. (See Diagram 5-17.)	

MATERIALS

TEACHING STRATEGIES

2. Place a piece of transparent tape over this opening.

Caution students not to touch the tape to anything or with anything.

Distribute microscopes. Instruct students to examine at least one piece of tape before they take the collecting cards to their places. Discuss how the tape looks now and tell the students that they will examine the tapes once again after they have been sitting out for twenty-four hours.

When the collecting cards have been prepared and examined under the microscope, have students take them to the places they have chosen and written on their cards. If the cards are to be placed outdoors, tell the students to put a small rock carefully on the card so it won't blow away. If the cards are to be placed indoors, caution students to place them where they will not be disturbed or moved. Leave the collecting cards in their places overnight.

The next day allow students to collect the cards and examine them under the microscope. They should notice a variety of specks, lines, and things that were not present the day before.

Ask:

TEACHING STRATEGIES

ce of transparent tape over this

not to touch the tape to anything or

copes. Instruct students to examine at
f tape before they take the collecting
aces. Discuss how the tape looks now
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them where they will not be disturbed
the collecting cards in their places

WAITING TIME

students to collect the cards and
the microscope. They should notice
s, lines, and things that were not
fore.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--prepare air collecting cards.
--examine the cards under a microscope.

--re-examine cards with the microscope.

ACTIVITY
5-31

MATERIALS

TEACHING STRATEGIES

ARE THERE THINGS PRESENT IN THE AIR THAT WE CAN'T SEE?

WHAT ARE THESE THINGS THAT WE SEE THROUGH THE MICROSCOPES?

WHICH PLACE HAD THE MOST THINGS IN THE AIR?

WHY?

WOULD THIS STUFF IN THE AIR BOTHER PEOPLE?

HOW?

DO YOU KNOW ANYONE WHO IS BOTHERED BY THINGS THAT ARE IN THE AIR?

WHAT COULD BE DONE TO GET RID OF ALL THE STUFF WE PUT INTO THE AIR?

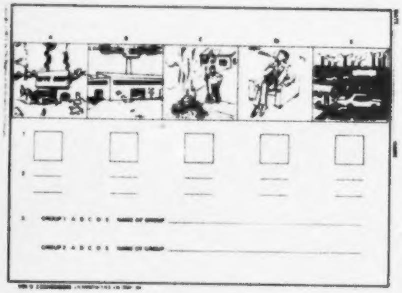
CLUES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HINGS PRESENT IN THE AIR THAT WE	--indicate that there are things present in the air that cannot be seen.
HESE THINGS THAT WE SEE THROUGH THE S?	--suggest dust, dirt, smoke, and such as the things they saw through the microscopes.
HAD THE MOST THINGS IN THE AIR?	--indicate which place had the most things in the air.
	--suggest such reasons as more people around, more air movement, and so forth.
STUFF IN THE AIR BOTHER PEOPLE?	--suggest that it might.
	--suggest such effects as respiratory problems, visibility problems, ugliness, and so on.
ANYONE WHO IS BOTHERED BY THINGS THE AIR?	--relate their personal knowledge of relatives and friends who are bothered by additives in the air.
BE DONE TO GET RID OF ALL THE STUFF THE AIR?	--suggest many ways to cut down on air pollution, such as cleaning the smoke, fewer cars, not burning garbage, well-tuned cars, using car pools and public transportation, not burning leaves, and filters on smoke stacks.

CLUES TO SUCCESS

MATERIALS

Worksheet 5-16



Slide 5-63

TEACHING STRATEGIES

Clues to Success

The purpose of this Clue to Success is to have the students discuss various types of air pollution, to practice serial ordering, to practice grouping, and to observe and describe things in the environment. Discussing this activity is as important as completing the worksheet.

Distribute Worksheet 5-16. You may want to provide practice in following directions and in knowing left and right. Instruct the students to put their names and the date in the spaces provided.

DISTRIBUT

Say:

> READ THE QUESTION TO YOURSELF AS I READ IT ALOUD. THEN MARK YOUR ANSWER TO EACH QUESTION. DO NOT TELL ANYONE WHAT YOUR ANSWERS ARE UNTIL WE TALK ABOUT THEM LATER.

Project Slide 5-63.

> WHAT IS IN PICTURE A?

Proceed in this manner with Pictures B through E. Do not elicit detailed descriptions at this time.

TEACHING STRATEGIES

is Clue to Success is to have the
various types of air pollution, to
rdering, to practice grouping, and to
ibe things in the environment. Discuss-
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eet 5-16. You may want to provide
wing directions and in knowing left
uct the students to put their names
he spaces provided.

DISTRIBUTE MATERIALS

STION TO YOURSELF AS I READ IT
MARK YOUR ANSWER TO EACH QUESTION.
ANYONE WHAT YOUR ANSWERS ARE UNTIL
T THEM LATER.

3.

ICTURE A?

anner with Pictures B through E. Do
ed descriptions at this time.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "A garbage dump."

--respond for other pictures: B. "A factory with a smokestack," C. "A person burning leaves," D. "A person smoking a cigarette," E. "Many factories and vehicles."

ACTIVITY
5-31

MATERIALS

TEACHING STRATEGIES

Draw the students' attention to the blank boxes below the pictures for Question 1.

Say:

> EACH OF THESE PICTURES SHOWS THAT SOMETHING IS BEING ADDED TO THE AIR. LOOK AT THEM CAREFULLY AND DECIDE IN WHICH PICTURE THERE ARE THE MOST THINGS BEING ADDED TO THE AIR. PUT A 1 IN THE BOX BELOW THAT PICTURE. THEN DECIDE WHICH PICTURE SHOWS FEWER THINGS BEING ADDED TO THE AIR, AND PUT A 2 BELOW THAT PICTURE. GIVE EACH OF THE PICTURES A NUMBER FROM 1 TO 5 TO PUT THEM IN ORDER FROM THE ONE WITH THE MOST TO THE ONE WITH THE LEAST THINGS ADDED TO THE AIR.

See if there are any questions and circulate around the room to verify that the students are following the instructions.

Continue to project Slide 5-63. Direct the students' attention to the blank lines of Question 2 on their worksheets.

Say:

> WRITE AS MANY WORDS AS YOU CAN THINK OF TO DESCRIBE THE THINGS IN THE PICTURES.

Assist the students as necessary with spelling. Provide dictionaries if your students are able to use them.

Continue to project Slide 5-63.

TEACHING STRATEGIES

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r Question 1.

ESE PICTURES SHOWS THAT SOMETHING IS
D TO THE AIR. LOOK AT THEM CAREFULLY
IN WHICH PICTURE THERE ARE THE MOST
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your students are able to use them.

ject Slide 5-63.

ANTICIPATED STUDENT BEHAVIORS

Students should:

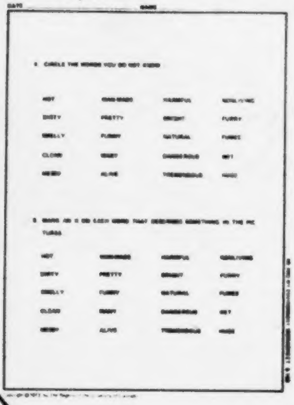
--number the pictures from most to least:

A. 3
B. 2
C. 4
D. 5
E. 1

--write descriptive words on the lines provided.

MATERIALS

Slide 5-64



TEACHING STRATEGIES

Ask:

> DO YOU THINK THESE FIVE PICTURES CAN BE PUT INTO TWO GROUPS?
>
> WILL THERE BE THE SAME NUMBER OF PICTURES IN EACH GROUP?

After establishing that one group will have more pictures than the other, tell students to think of a way to group the pictures. Remind them that there is often more than one way to group.

Now direct their attention to Question 3. Instruct them to circle the letter of each picture that belongs in one of the groups they have made.

Then say:

> NOW WRITE A NAME FOR THAT GROUP ON THE LINE NEXT TO THE LETTERS YOU HAVE CIRCLED.

Instruct students to do the same for Group 2.

Have students turn their worksheets over to continue with Questions 4 and 5.

Project Slide 5-64.

Say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
IK THESE FIVE PICTURES CAN BE PUT ROUPS?	--respond, "Sure."
BE THE SAME NUMBER OF PICTURES IN	--respond, "No."
ng that one group will have more e other, tell students to think of he pictures. Remind them that there is one way to group.	
attention to Question 3. Instruct them tter of each picture that belongs in s they have made.	--circle the letter of each picture that belongs in one of the groups they have made.
NAME FOR THAT GROUP ON THE LINE LETTERS YOU HAVE CIRCLED.	--write the name of a group, such as, "People in the picture," or "Shows less pollution."
s to do the same for Group 2.	--circle the letters for each picture in the other group, such as B, C, and E; name the group such as, "No people in the picture," or "Shows the most pollution."
n their worksheets over to continue with .	
4.	

MATERIALS

TEACHING STRATEGIES

> FIND THE LIST OF WORDS FOR NUMBER 4. I WILL READ THE WORDS. CIRCLE ANY WORDS YOU DO NOT UNDERSTAND.

Once students have located the list of words, you may wish to shut off the projector so they are not distracte by the slide. Be sure to repeat each word.

Project Slide 5-63 again.

Read the instructions and tell the students to look agai at the pictures projected on the screen. Read and repea each word. Tell the students to circle any word that describes something in the pictures.

When the students are finished, collect their worksheets Discuss each question and use the slide to assist in the discussion.

Interpretation and Scoring:

Question 1 was designed to assess whether students are able to order serially a set of pictures "in their heads without any physical manipulation. If you have a spare worksheet, provide the opportunity for students who experienced difficulty with this task to cut out and manipulate the pictures. This question also assesses th students' ability to observe and react to the gradations of additives to the air. Review Activities 5-30 and 5-31 as necessary.

Question 2 reflects the students' background in observin and describing without being cued by written suggestions (as in Question 5). Most students will be able to

TEACHING STRATEGIES

IST OF WORDS FOR NUMBER 4. I WILL
ORDS. CIRCLE ANY WORDS YOU DO NOT
.

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-63 again.

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ty to observe and react to the gradations
the air. Review Activities 5-30 and
ry.

ects the students' background in observing
without being cued by written suggestions
5). Most students will be able to

ANTICIPATED STUDENT BEHAVIORS

Students should:

--circle the words in Question 4 they do not understand.

--mark an X on each word that describes something in the pictures, probably omitting natural, pretty, funny, bright, furry, wet, and clean.

--explain and defend their choices.

MATERIALS

TEACHING STRATEGIES

generate at least a few descriptive words. Compare these results with Tallysheet 5-3 in Activity 5-10.

Question 3 assesses the students' background in creating and labeling groups. While the number of objects in each group is smaller than in previous groups, greater difficulty will be encountered in generating ideas for grouping. Compare the results with Activities 5-10 and 5-24.

Question 4 provides a guideline for vocabulary development. Use your initiative to help the students enrich their vocabularies!

Question 5 is another assessment of the students' background in describing. Students who mark less than six words may be considered low in describing and need many experiences in describing. Students who mark six to ten words have medium background, while those who have more than ten words marked have a high level of describing skills.

Specific instructions for scoring are on Tallysheet 5-8. Complete the tallysheet and send it to BSCS. Instructions are also given on the Tallysheet for recording the results in the Student Record of Progress.

TEACHING STRATEGIES

t a few descriptive words. Compare these llysheet 5-3 in Activity 5-10.

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ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have observed Slides 5-60 through 5-64.*
- *--have noticed dust in the air in the classroom.*
- *--have participated in collecting air samples.*
- *--have examined the tape on the collecting cards, using the microscope.*
- *--have completed and discussed Worksheet 5-16.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE G
ACTIVITY 5-31

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐No ☐Yes Obtained by you? ☐No ☐Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐No ☐Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐Yes ☐No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐Yes ☐No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐Worthwhile --keep as is ☐Of value--needs the revision suggested ☐Worth salvaging--make major changes described ☐Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did students have any problems in using the microscope? ☐Yes ☐No If so, what types of problems did they have?

would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did students have any problems in using the microscope? ☐ Yes ☐ No If so, what types of problems did they have?

13. What problems, if any, did students have in preparing the air sample collection cards?

14. Were students able to understand the instructions for the serial numbering task on Worksheet 5-16?

15. Complete and send Tallysheet 5-8 to BSCS.

Side A

UNIT V, CORE G
ACTIVITY 5-31

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution in our environment.

Core G Objectives for the Student:

1. Establish that substances are added to natural air because of man's activities.
2. Establish that an additive to air need not be seen to be present.

ENVIRONMENTAL THEME:

Complementarity of Organisms and Environment, Ecological Trade-offs

INQUIRY SKILLS:

Predicting, Applying

PROBLEM-SOLVING SKILLS:

Organizing Data, Recognizing a Problem and Formulating a Question

PRACTICAL APPLICATION:

Knowledge That Noxious Gases Exist, Following Directions, Communication Skills

Me and my· Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

7. Understand the composition of air.

8. Realize that the quality of air is variable.

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TIVITY

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LS:
ing, Applying

ING SKILLS:
ing Data, Recognizing a Problem and
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PLICATION:
ge That Noxious Gases Exist, Following
ns, Communication Skills

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE G. ADDITIVES IN OUR AIR

ACTIVITY 5-32. ALTERED AIR AND LIFE

ACTIVITY
5-32

MATERIALS

*2 Growing bean plants per pair of students
*Car
*2 One-quart jars with lids per pair of students
*Paper
*Pencil
*Glass jars with lids, at least five, any size
*1 Drop of at least five of the following:
  Vinegar
  Turpentine
  Gasoline
  Kerosene
  Glue
  Perfume
  Aftershave
  Air freshener
  Deodorant
  Ammonia

(continued on next page)

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-32. Altered Air and Life

The purpose of this activity is to have the students determine that the invisible additives in air affect th quality of the air. Plants and car exhaust will be used to illustrate this concept. Also in this activity the students will choose one of the pictures (drawings or photographs) from the display in Activity 5-30 and analyze it. They will identify what is being added to the air, the source of the additive, the form it has taken, and whether or not it will do any harm.

Teacher Preparation:

1. Obtain at least five glass jars with lids. Into each glass jar put one drop of one of the following substances and screw the lid on tightly. These drops will put an odor into the air contained in the jars. Display the jars somewhere in the classroom where they can be easily seen by all students.

Vinegar	Perfume
Turpentine	Aftershave
Gasoline	Air freshener
Kerosene	Deodorant
Glue	Ammonia

2. To germinate the bean seeds, plant them in small containers such as paper drinking cups that will fit inside the quart jars. Fill the container with a three-inch layer of dirt, and plant the bean seed about one-inch below the surface. In four to six days, the plant should be approximately two- to three-inches tall.

TEACHING STRATEGIES

. Altered Air and Life

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	Perfume
ine	Aftershave
e	Air freshener
e	Deodorant
	Ammonia

inate the bean seeds, plant them in small rs such as paper drinking cups that will de the quart jars. Fill the container hree-inch layer of dirt, and plant the d about one-inch below the surface. In six days, the plant should be approxi- wo- to three-inches tall.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--recall the various components of air.
--categorize the components of air as natural or man-made.
--smell several jars of air.
--define fumes as unseen additives to the air.
--perform the exhaust experiment.
--participate in developing an observation sheet.
--record his observations of the plants in Jars 1 and 2.
--conclude that fumes can be harmful to living things.
--choose an item from the bulletin board display and identify what is being added to the air, its source, its form, and what harm it might do.

MATERIALS

*Masking tape
*Picture of a car
*Bulletin board display from Activity 5-30
*Cassette tape recorder
*Blank tapes

*Not furnished in materials kit

TEACHING STRATEGIES

Begin this activity by asking:

WHAT IS FOUND IN THE AIR IN OUR ROOM?

WHICH OF THESE ARE NATURAL AND WHICH ARE MAN-MADE?

List the students' responses on the chalkboard in two categories: those that are natural and those that are man-made. It may be necessary to explain to the students that natural refers to something meant to be in the air.

Natural	Man-made
Oxygen	Smoke
Carbon Dioxide	Dust
Water	Dirt

Ask:

CAN YOU ALWAYS SEE WHAT IS IN THE AIR?

Draw the students' attention to the jars on the table.

Then ask:

DO YOU SEE ANYTHING IN THESE JARS?

DO YOU SEE ANYTHING IN THE AIR CONTAINED IN THE JARS?

Ask several students to open the jars on the table, sniff the air in them and try to identify what, if anything, is in the air. After the students have attempted to

TEACHING STRATEGIES

vity by asking:

UND IN THE AIR IN OUR ROOM?

HESE ARE NATURAL AND WHICH ARE MAN-

ts' responses on the chalkboard in two
ose that are natural and those that are
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fers to something meant to be in the air.

	Man-made
	Smoke
ide	Dust
	Dirt

AYS SEE WHAT IS IN THE AIR?

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ANYTHING IN THESE JARS?

ANYTHING IN THE AIR CONTAINED IN THE

ents to open the jars on the table, sniff
and try to identify what, if anything,
After the students have attempted to

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recall and state the components of air discussed previously, such as, "Dirt," "Carbon dioxide," Oxygen."

--categorize the components as natural or man-made.

--respond, "No," "Only sometimes," "I don't know."

--respond, "No," "They're clear," "Nothing but air."

--respond, "I don't see anything," "Doesn't look like it."

MATERIALS

TEACHING STRATEGIES

identify what is in the air contained in the jars, continue the discussion by asking:

> HOW DID WE KNOW THAT THERE WAS SOMETHING ADDED TO THE AIR IN THE JARS?

> CAN YOU ALWAYS SMELL TO FIND OUT IF SOMETHING IS IN THE AIR?

> WHAT THINGS ARE ADDED TO THE AIR THAT WE CANNOT SEE OR SMELL?

> ADDITIONS TO THE AIR THAT WE CANNOT SEE ARE CALLED FUMES.

Write the word "fumes" on the chalkboard.

> CAN FUMES IN THE AIR BE DANGEROUS TO LIVING THINGS?

Set on a table the one- quart glass jars, bean plants, masking tape, and a picture of a car.

Then ask:

> HOW COULD WE USE THESE THINGS TO FIND OUT IF FUMES ARE DANGEROUS TO LIVING THINGS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
is in the air contained in the jars, iscussion by asking:	
E KNOW THAT THERE WAS SOMETHING ADDED R IN THE JARS?	--respond, "We smelled inside the jars," "We sniffed."
LWAYS SMELL TO FIND OUT IF SOMETHING AIR?	--speculate on how often additives in the air can be smelled.
GS ARE ADDED TO THE AIR THAT WE CANNOT ELL?	--suggest such things as gases, water vapor, sprays.

ACCEPT ALL ANSWERS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
TO THE AIR THAT WE CANNOT SEE ARE ES.	
"fumes" on the chalkboard.	
IN THE AIR BE DANGEROUS TO LIVING	--speculate about how dangerous fumes are to living things.
the one- quart glass jars, bean plants, nd a picture of a car.	
WE USE THESE THINGS TO FIND OUT IF DANGEROUS TO LIVING THINGS?	--suggest various ways to use the bean plants, jars, and car to find out if fumes are dangerous to living things.

MATERIALS

TEACHING STRATEGIES

ENCOUR
CREATI
IDEA

Incorporating the students' ideas into the experiment as much as possible, follow the directions below to set up the investigation.

1. Distribute a quart jar and a bean plant to each student pair. Instruct the students to place a bean plant in one of the jars and cap it. Label it "Jar 1" and set it aside.

NOTE: The entire paper cup that contains the plant can be placed in the jar. It is not necessary to replant the bean sprout into the larger jar.

2. Distribute another quart jar to each student pair. Tell them to take this quart jar with them when they go outside. Take students into the school parking lot and start your car or one you've arranged to use. Before the students continue, allow the car to run until there is no black smoke coming from the exhaust.

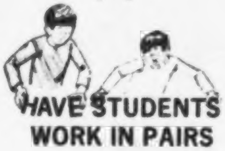
3. Direct the students to hold their open jars close to or over the exhaust pipe and collect some exhaust. Immediately cap the jars.

4. When all the student pairs have collected their exhaust samples, return to the classroom and

TEACHING STRATEGIES

ENCOURAGE
CREATIVE
IDEAS

e students' ideas into the experiment as
, follow the directions below to set up
n.



a quart jar and a bean plant to each
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ng from the exhaust.

students to hold their open jars close
the exhaust pipe and collect some
Immediately cap the jars.

e student pairs have collected their
ples, return to the classroom and

ANTICIPATED STUDENT BEHAVIORS

Students should:

instruct them to place a bean plant in the jar quickly and immediately to cap it. Label this jar, Jar 2.

5. Direct the students to put their names on the jars and place both of them in the sunlight.

Ask:

WHAT KIND OF AIR IS IN JAR 1?

WHAT KIND OF AIR IS IN JAR 2?

Tell the students that each day during science class they will be replenishing the air in Jar 2 with more car exhaust, and the natural air in Jar 1 with more natural air. They will also need to water the bean plants daily.

WHAT DO YOU THINK WILL HAPPEN TO THE PLANT IN JAR 1?

WHAT DO YOU THINK WILL HAPPEN TO THE PLANT IN JAR 2?

HOW COULD WE KEEP TRACK OF WHAT IS HAPPENING TO THE PLANTS EACH DAY?

Assist the students in developing some type of observati sheet, such as:

	Jar 1 (natural)	Jar 2 (exhaust)
Day 1:		
Day 2:		
Day 3:		
Day 4:		
Day 5:		

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
them to place a bean plant in the jar nd immediately to cap it. Label this 2.	
e students to put their names on the place both of them in the sunlight.	
OF AIR IS IN JAR 1?	--respond, "Natural air," "Regular air."
OF AIR IS IN JAR 2?	--respond, "Air with fumes in it," "Man-made air," "Bad air," "Car air."
ts that each day during science class plenishing the air in Jar 2 with more car e natural air in Jar 1 with more natural also need to water the bean plants	
U THINK WILL HAPPEN TO THE PLANT	--predict that it will live.
U THINK WILL HAPPEN TO THE PLANT	--predict that it will die, wither, get sick.
WE KEEP TRACK OF WHAT IS HAPPENING TO EACH DAY?	--suggest recording what they look like, taking pictures of the plants, drawing them.
ents in developing some type of observation	
(natural) Jar 2 (exhaust)	

MATERIALS

TEACHING STRATEGIES

Use student suggestions! There are many ways to record observations!

The plant exposed to the car exhaust should die within a week. When this happens, ask:

WHAT HAS HAPPENED TO THE PLANTS?

WHY DID THE PLANT IN JAR 2 DIE?

WHICH AIR IS BETTER FOR THE PLANTS? WHY?

ARE FUMES IN THE AIR HARMFUL TO PLANTS?

IF FUMES CAN BE HARMFUL TO PLANTS, COULD THEY ALSO BE HARMFUL TO US?

WHAT TYPES OF FUMES DID WE PUT IN THE JAR?

WE COULD SMELL THE FUMES IN THE CAR EXHAUST. THERE ARE SOME FUMES THAT ARE ESPECIALLY DANGEROUS BECAUSE THEY CANNOT BE SEEN OR SMELLED.

WHAT ARE SOME OTHER TYPES OF FUMES THAT MIGHT BE HARMFUL TO LIVING THINGS?

At this point in the discussion, be sure to mention carbon monoxide (car exhaust) if it is not mentioned by the students. Other fumes that many times cause accidental deaths and deserve special mention are those from gas stoves or heaters, camp stoves, sewers (methane gas), and burning coal (hydrogen sulfide).

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
gestions! There are many ways to record	
ed to the car exhaust should die within a happens, ask:	
PPENED TO THE PLANTS?	--observe that the plant in the natural air is still healthy and that the plant in the man-made air is dying.
PLANT IN JAR 2 DIE?	--state that the plant died because the exhaust fumes present in the air.
S BETTER FOR THE PLANTS? WHY?	--infer that the natural air is better for the plants because the man-made air caused it to die.
N THE AIR HARMFUL TO PLANTS?	--respond, "Yes," "The plant died," "It makes things die."
N BE HARMFUL TO PLANTS, COULD THEY MFUL TO US?	--respond, "Yes," "We'd probably die, too."
OF FUMES DID WE PUT IN THE JAR?	--respond, "Car fumes," "Exhaust."
LL THE FUMES IN THE CAR EXHAUST. ME FUMES THAT ARE ESPECIALLY CAUSE THEY CANNOT BE SEEN OR	
E OTHER TYPES OF FUMES THAT MIGHT O LIVING THINGS?	--suggest other types of fumes that might be harmful to humans or to other living things.
the discussion, be sure to mention car exhaust) if it is not mentioned by her fumes that many times cause and deserve special mention are oves or heaters, camp stoves, sewers d burning coal (hydrogen sulfide).	

ACTIVITY
5-32

MATERIALS

TEACHING STRATEGIES

CLUE

As a culminating activity to assess informally the students' understanding of what man adds to the air, proceed with the following:

> WE HAVE BEEN DISCUSSING AIR AND WHAT WE PUT IN IT.

Point to the bulletin board display from Activity 5-30.

> WHAT DOES OUR BULLETIN BOARD DISPLAY SHOW US?

> WHAT HAVE WE LEARNED ABOUT THE THINGS THAT ARE PUT IN THE AIR?

Write the following on the chalkboard:

1. What is being added to the air?
2. Where is it coming from?
3. Can you see it?
4. Will it do any harm?

Tell the students that their job for this class period is to take the role of an air pollution inspector.

To do this they will choose one of the pictures on the bulletin board. (They may bring the picture to their

TEACHING STRATEGIES

CLUES TO SUCCESS

g activity to assess informally the
rstanding of what man adds to the air,
e following:

EN DISCUSSING AIR AND WHAT WE PUT IN

lletin board display from Activity 5-30.

OUR BULLETIN BOARD DISPLAY SHOW US?

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AIR?

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ee it?

o any harm?

ts that their job for this class period
role of an air pollution inspector.

will choose one of the pictures on the
(They may bring the picture to their

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recall Activity 5-30 and say, "Air pollution," "Things in the air," "Proves that there's stuff in the air."

--respond, "What they are," "What they do," "That they are bad for us," "That some you can see and some you can't," "You can't smell some."

MATERIALS

TEACHING STRATEGIES

desk if they choose.) They will inspect the place in the picture for air pollution by answering the questions on the chalkboard. The air pollution report made for this place may be written, taped, or given to the teacher orally.

Do not give any guidance to the student at this point. If he has been successful with this core of activities, he should be able to choose a picture and analyze it as suggested.

Encourage any students who might wish to give their air pollution report to the class, to do so. If any students wish to analyze more than one picture, encourage them also.

CHANGE

See Change of Pacer 36, 37, and 38.

TEACHING STRATEGIES

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CHANGE OF PACER

cer 36, 37, and 38.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, __each__ __student__ should, as a minimum:

- *--have participated in setting up the plant experiment.*
- *--have observed that the plant in the exhaust jar died.*
- *--have stated that fumes can be harmful to living things.*
- *--have chosen an item from the bulletin board display and identified what is being added to the air, its source, its form, and what harm it might do.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE G
ACTIVITY 5-32

Teacher ______________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did students suggest workable experiments using the plants, the jars, and the car? ☐ Yes ☐ No Comment.

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) _______________ Comment:

Specific Questions:

12. Did students suggest workable experiments using the plants, the jars, and the car? ☐ Yes ☐ No Comment.

13. Did the students have any problems in conducting the bean plant experiment?
☐ No ☐ Yes If so, what problems did they have?

14. How much help did the students require in devising an observation record? Comment.

15. Select several written or taped pollution reports and send them to BSCS.

Side A

UNIT V, CORE G
ACTIVITY 5-32

Teacher ________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

8. Realize that the quality of air is variable.

9. Realize that substances are continually added to air.

10. Comprehend the impact of air pollution on our environment.

Core G Objectives for the Student:

1. Establish that substances are added to natural air because of man's activities.

2. Establish that an additive to air need not be seen to be present.

3. Establish that some things added to air are harmful to living things.

ENVIRONMENTAL THEME:

Population Dynamics, Finiteness of Resources

INQUIRY SKILLS:

Translating, Value Judging

PROBLEM-SOLVING SKILLS:

Drawing Conclusions

PRACTICAL APPLICATION:

Making a Graph, Safety, Motor Skills

ACTIVITY

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9. Realize that substances are continually added to air.

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TAL THEME:
tion Dynamics, Finiteness of Resources

ILLS:
lating, Value Judging

VING SKILLS:
g Conclusions

PPLICATION:
a Graph, Safety, Motor Skills

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

CORE G. ADDITIVES IN OUR AIR

ACTIVITY 5-33. DO WE NEED A FILTER ON OUR TOWN?

ACTIVITY
5-33

MATERIALS

Worksheet 5-17
Slide 5-65
Water pipe, 1 per pair of students, with extra vial
Mityvac hand pump, 1 per pair of students
Vinyl tubing, 2 twelve-inch pieces of 1/4-inch inside diameter, per pair of students
Broad range indicator solution, Hach Chem. #443
*Distilled water
*Chalk
*Ruler or yardstick
*Bottle of rinse water
*35 mm Slide projector
*Paper Towels

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-33. Do We Need a Filter on Our Town?

This activity will relate directly to Activity 5-32 and will involve testing for the actual pollutants produced by auto exhausts. The amount of pollutants in the air will be measured at varying distances from the exhaust pipe. The test will enable the student to relate dilution as an important factor in the ability of the environment to absorb pollutants.

The students should still be involved in Activity 5-32, Altered Air and Life, as far as the daily collection of exhaust is concerned. Before the students prepare for their next collection of exhaust fumes to replenish the plant jars, explain:

> BESIDES COLLECTING EXHAUST FOR YOUR PLANT JARS, TODAY WE WILL ALSO DO A TEST TO FIND OUT HOW WELL FUMES MIX INTO THE AIR.
>
> WHAT ARE FUMES?

Hold up the hand pump and water pipe, and say:

TEACHING STRATEGIES

Do We Need a Filter on Our Town?

will relate directly to Activity 5-32 ve testing for the actual pollutants to exhausts. The amount of pollutants l be measured at varying distances from pe. The test will enable the student to n as an important factor in the ability ment to absorb pollutants.

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OLLECTING EXHAUST FOR YOUR PLANT JARS, WILL ALSO DO A TEST TO FIND OUT HOW S MIX INTO THE AIR.

FUMES?

nd pump and water pipe, and say:

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--continue to collect exhaust in the plant jars for Activity 5-32.*
- *--help to assemble the water pipe-pump apparatus.*
- *--make tests for fumes in the air at one, two, three, and four feet from the tail pipe of a car.*
- *--record the number of strokes required to change the color of the solution at each mark on Worksheet 5-17.*
- *--graph his results on Worksheet 5-17.*
- *--contribute his data to a class graph.*
- *--conclude that the farther away from the source of fumes, the fewer fumes are present in the air.*
- *--guess how many strokes it would take to turn the test solution yellow at ten feet.*
- *--realize that it is dangerous to run a car in a closed garage.*
- *--define pollution as something in the air that is out of place.*

Students should:

--recall that fumes are additions to the air that we cannot see.

MATERIALS

TEACHING STRATEGIES

THIS IS THE EQUIPMENT WE WILL USE TO FIND OUT IF FUMES COMING FROM THE EXHAUST ARE STILL IN THE AIR.

WHAT ARE THESE PIECES OF EQUIPMENT?

Review the filling of the water pipe chamber with the students and direct them to assemble the apparatus as in Activity 5-25. Explain that the pump will pull air into the chamber just as it did in Activity 5-25. As the air enters the chamber, it will bubble through the test solution. The test solution will change from green to yellow if fumes (pollution) are in the air. The more fumes present, the quicker the solution will change. The amount of fumes in the air can be measured by counting the number of pump strokes needed to cause the color change. The fewer the strokes needed to change the color, the more fumes in the air. Write these directions on the chalkboard, read them to the students, and direct them to begin assembling the apparatus.

1. Fill the water pipe up to the top mark with distilled water.

NOTE: Distilled water is used because there is too much variability in the quality of tap water throughout the country. Use of distilled water ensures a predictable outcome of the experiment.

2. Add five drops of test solution to the water.

TEACHING STRATEGIES

EQUIPMENT WE WILL USE TO FIND OUT
MING FROM THE EXHAUST ARE STILL IN

ESE PIECES OF EQUIPMENT?

ng of the water pipe chamber with the
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Explain that the pump will pull air into
as it did in Activity 5-25. As the air
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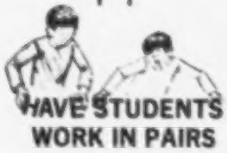
embling the apparatus.


HAVE STUDENTS
WORK IN PAIRS

ter pipe up to the top mark with
ater.

water is used because there is too much
y in the quality of tap water throughout
y. Use of distilled water ensures a
e outcome of the experiment.

ps of test solution to the water.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--identify the pump and water pipe as pieces of equipment used in Activity 5-25.

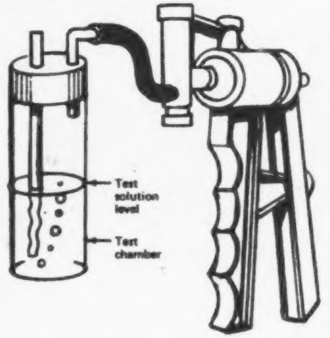
--fill the water pipe.

--add the test solution.

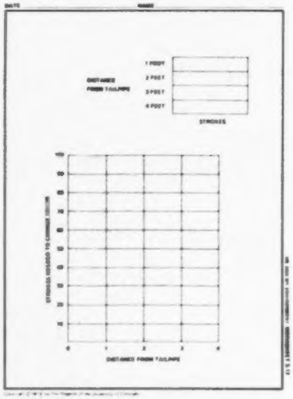
ACTIVITY
5-33

MATERIALS

Diagram 5-15



Worksheet 5-17



TEACHING STRATEGIES

3. Put the cap on the bottle.

4. Connect the tubing from the pump to the bent tube of the water pipe.

The water pipe apparatus should look like the one in Diagram 5-15 when assembled.

Help the students assemble the water pipes as necessary.

Distribute Worksheet 5-17 to each student pair. Explain that they will be using only the top part of the worksheet for their exhaust collecting. Point to the upper part of the worksheet and say:

> YOU WILL BE TESTING FUMES ONE FOOT, TWO FEET, THREE FEET, AND FOUR FEET FROM THE TAILPIPE OF A CAR. TO DO THIS YOU WILL HOLD THE WATER PIPE IN THE PATH OF THE CAR EXHAUST, BEGIN PUMPING TO DRAW THE AIR THROUGH THE TEST SOLUTION, AND COUNT HOW MANY STROKES OF THE PUMP IT TAKES TO TURN THE TEST SOLUTION FROM GREEN TO YELLOW. THEN YOU WILL WRITE THE NUMBER OF STROKES IT TOOK IN THE BOX ON THE WORKSHEET, NEXT TO WHERE IT SAYS ONE FOOT IF YOU WERE AT THE ONE-FOOT MARK; NEXT TO WHERE IT SAYS TWO FEET IF YOU TESTED AT THE TWO-FOOT MARK, AND SO FORTH.
>
> I WILL GIVE YOU THE DIRECTIONS AGAIN WHEN WE GO OUTSIDE.

Allow the students to ask any questions they might have about the worksheet or the testing procedure.

The students should carry with them the plant jars from Activity 5-32, the water pipe apparatus with the extra

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
cap on the bottle.	--cap the bottle.
the tubing from the pump to the bent the water pipe.	--connect the tubing.
apparatus should look like the one in hen assembled.	
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VE YOU THE DIRECTIONS AGAIN WHEN WE E.	
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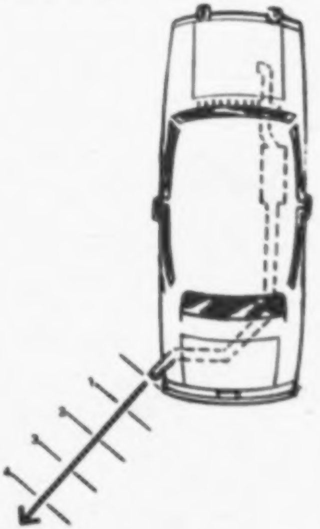
MATERIALS

Diagram 5-16



TEACHING STRATEGIES

bottle, the test solution, paper towels, rinse water, Worksheet 5-17, and a pencil. A large beaker can be used to carry the equipment outside.

DISTRIBUT

You should carry outside two pieces of chalk and two rulers. Take the students outside to one or more autos that you have arranged to use. Start the engines. Have the students first collect the auto exhaust to replenish their plant jars as required for Activity 5-32. Set the jars aside.

With a piece of chalk, mark a line on the pavement directly below the end of the tailpipe on the car. Then direct two students (preferably those who need practice measuring) to mark a chalk line one foot from the end of the tailpipe (or the first mark), two feet, three feet, and four feet. (See Diagram 5-16.)

Each pair of students should now proceed to make their tests. Review with them the procedure outlined below so that all students understand what they are to do.

1. Hold the open end of the straight tube of the water pipe directly in the exhaust stream above the one-foot mark on the pavement.
2. Begin pumping slowly.
3. Count the strokes.
4. Stop pumping immediately when the test solution changes from green to yellow.

TEACHING STRATEGIES

solution, paper towels, rinse water,
and a pencil. A large beaker can be
e equipment outside.

DISTRIBUTE MATERIALS

outside two pieces of chalk and two
e students outside to one or more
ave arranged to use. Start the engines.
s first collect the auto exhaust to
plant jars as required for Activity 5-32.
de.

chalk, mark a line on the pavement
he end of the tailpipe on the car. Then
nts (preferably those who need practice
rk a chalk line one foot from the end
(or the first mark), two feet, three
eet. (See Diagram 5-16.)

dents should now proceed to make their
ith them the procedure outlined below
ents understand what they are to do.

pen end of the straight tube of the
directly in the exhaust stream above
ot mark on the pavement.

ng slowly.

trokes.

g immediately when the test solution
m green to yellow.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--measure and mark off chalk lines.

--collect exhaust samples.

--begin pumping.

--count the strokes.

--stop pumping.

MATERIALS

TEACHING STRATEGIES

5. Record the number of strokes required for the color change on Worksheet 5-17.

6. Remove the top from the water pipe and cap the bottle part of the pipe with a solid cap. Keep this for a comparison.

7. Fill the second bottle to the mark with distilled water and add five drops of test solution. Put the water pipe cap on the bottle.

8. Repeat the test at the next mark (two feet).

9. Stop pumping when the test solution matches the yellow color of the first bottle that was saved.

10. Record the strokes required on Worksheet 5-17.

Repeat the same procedure at the third (three-foot) and fourth (four-foot) mark. Remember to rinse the bottle with tap water between each use. Also remind the studen to hold the water pipe about the same distance above th ground for each test.

Students should exchange jobs each time they test. If Student A pumped at the one-foot mark while Student B filled and assembled the water pipe, then they should switch jobs at the two-foot mark.

Direct the students to begin their testing.

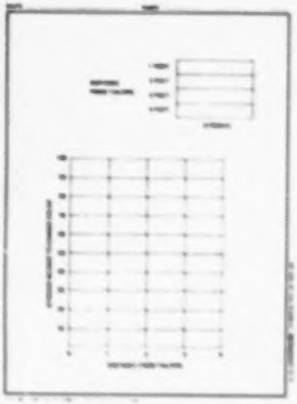
When all the tests have been made, reassemble the studen in the classroom.

Say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
e number of strokes required for the nge on Worksheet 5-17.	--record their count.
e top from the water pipe and cap the rt of the pipe with a solid cap. Keep a comparison.	--cap the comparison bottle.
second bottle to the mark with distilled add five drops of test solution. Put pipe cap on the bottle.	--reassemble the water pipe for use again.
e test at the next mark (two feet).	--start pumping at the two-foot mark.
ing when the test solution matches color of the first bottle that was	--stop pumping.
e strokes required on Worksheet 5-17.	--record their count.
procedure at the third (three-foot) and ot) mark. Remember to rinse the bottle between each use. Also remind the students r pipe about the same distance above the test.	
exchange jobs each time they test. If at the one-foot mark while Student B bled the water pipe, then they should the two-foot mark.	
nts to begin their testing.	
ts have been made, reassemble the students .	

MATERIALS

Slide 5-65



TEACHING STRATEGIES

IN ORDER TO BETTER UNDERSTAND THE RESULTS OF OUR EXPERIMENT, WE ARE GOING TO GRAPH WHAT WE FOUND.

WHAT IS A GRAPH?

A GRAPH SHOWS US SOMETHING WITHOUT WRITING IT OUT IN WORDS.

Project Slide 5-65.

Using the data collected by some of your slowest students, show the class on the projected graph how to plot their results.

Now have each pair of students plot their results on the graph located on the bottom half of Worksheet 5-17. Remember to erase the demonstration graph.

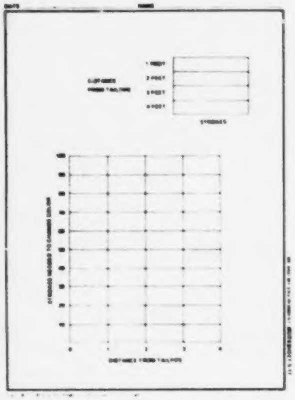
When the students have completed the worksheet, ask one member of each pair to go to the chalkboard and mark the point of their first (one-foot) count on the projected graph. (Read Change of Pacer 40 at this time.)

This should result in a cluster of marks above the one-foot point of the graph.

Then ask:

MATERIALS

Slide 5-65



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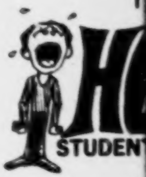
Now have each pair of students plot their results on the graph located on the bottom half of Worksheet 5-17. Remember to erase the demonstration graph.



When the students have completed the worksheet, ask one member of each pair to go to the chalkboard and mark the point of their first (one-foot) count on the projected graph. (Read Change of Pacer 40 at this time.)

This should result in a cluster of marks above the one-foot point of the graph.

Then ask:

TEACHING STRATEGIES

O BETTER UNDERSTAND THE RESULTS OF OUR
, WE ARE GOING TO GRAPH WHAT WE FOUND.

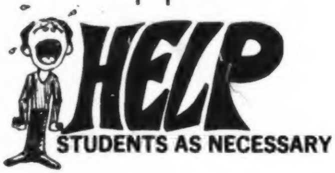
GRAPH?

OWS US SOMETHING WITHOUT WRITING IT
DS.

-65.

collected by some of your slowest students,
on the projected graph how to plot their

air of students plot their results on the
n the bottom half of Worksheet 5-17.
se the demonstration graph.



ts have completed the worksheet, ask one
pair to go to the chalkboard and mark the
first (one-foot) count on the projected
hange of Pacer 40 at this time.)

lt in a cluster of marks above the one-
e graph.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "A bunch of lines," "A thing with some dots on it," "It has a line across it," "A picture to show something."

MATERIALS

TEACHING STRATEGIES

BY LOOKING AT THE FIRST GROUP OF POINTS ON THE GRAPH, ABOUT HOW MANY STROKES DID IT TAKE TO CHANGE THE COLOR OF THE TEST SOLUTION WHEN WE WERE ONLY ONE FOOT AWAY FROM THE EXHAUST?

**GIV
TIM
TO
THE**

Review with the students that the fewer strokes of the pump it took to change the color of the test solution, the more fumes in the air.

Ask:

WERE THERE MANY FUMES IN THE AIR ONE FOOT AWAY FROM THE EXHAUST?

HOW DO YOU KNOW?

Then have the other member of each pair go to the chalkboard and mark the point of their second (two-foot) test on the projected graph.

Then ask:

BY LOOKING AT THE SECOND GROUP OF POINTS ON THE GRAPH, ABOUT HOW MANY STROKES DID IT TAKE TO CHANGE THE COLOR AT THE TWO-FOOT MARK?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
NG AT THE FIRST GROUP OF POINTS ON H, ABOUT HOW MANY STROKES DID IT CHANGE THE COLOR OF THE TEST SOLUTION WERE ONLY ONE FOOT AWAY FROM THE	--respond with an estimate of the average number of strokes required.
e students that the fewer strokes of the o change the color of the test solution, in the air.	
E MANY FUMES IN THE AIR ONE FOOT AWAY EXHAUST?	--respond, "Yes."
U KNOW?	--indicate that there were many fumes in the air because it didn't take many strokes to make the color change.
other member of each pair go to the mark the point of their second (two- the projected graph.	--record their second point on the projected graph.
G AT THE SECOND GROUP OF POINTS ON , ABOUT HOW MANY STROKES DID IT TAKE THE COLOR AT THE TWO-FOOT MARK?	--respond with an estimate of the average number of strokes required.

GIVE STUDENTS
TIME
TO
THINK

MATERIALS

TEACHING STRATEGIES

WERE THERE MORE OR LESS FUMES IN THE AIR AT THE SECOND MARK THAN AT THE FIRST MARK?

HOW DO YOU KNOW?

Repeat this procedure, alternating students, for the remaining three and four-foot distances. When all the points have been plotted on the class graph and discussed, ask:

WHY DID IT TAKE MORE STROKES TO CHANGE THE COLOR AT THE FOUR-FOOT MARK THAN IT DID AT THE ONE-FOOT MARK?

GIVE S
STUDENT
TO RE

WHY SHOULD THERE BE FEWER FUMES IN THE AIR FARTHER AWAY FROM THE EXHAUST?

IF WE HAD MADE A MARK TEN FEET AWAY FROM THE EXHAUST, HOW MANY STROKES DO YOU THINK IT WOULD TAKE TO TURN THE SOLUTION TO YELLOW? WRITE YOUR GUESS ON THE BACK OF YOUR WORKSHEET.

Discuss the students' guesses and collect the worksheets so you can look them over later to detect if any students will need review and/or extra help.

Then ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
MORE OR LESS FUMES IN THE AIR AT MARK THAN AT THE FIRST MARK?	--indicate that there were fewer fumes in the air at the second mark than at the first mark.
KNOW?	--respond, "Because it took more pumps to change the color of the test solution."
edure, alternating students, for the and four-foot distances. When all the plotted on the class graph and discussed,	
TAKE MORE STROKES TO CHANGE THE COLOR -FOOT MARK THAN IT DID AT THE ONE-	--respond, "It's farther away," "Farther from the tailpipe," "Not as many fumes in the air."
THERE BE FEWER FUMES IN THE AIR Y FROM THE EXHAUST?	--respond, "It's more spread out," "It blows away."
ADE A MARK TEN FEET AWAY FROM THE V MANY STROKES DO YOU THINK IT TO TURN THE SOLUTION TO YELLOW? GUESS ON THE BACK OF YOUR WORKSHEET.	--indicate that it would take a great many strokes to turn the solution to yellow at ten feet.
ents' guesses and collect the worksheets them over later to detect if any ed review and/or extra help.	

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

ACTIVITY
5-33

MATERIALS

TEACHING STRATEGIES

WHAT WOULD IT BE LIKE IF ALL OF THE CARS IN THE PARKING LOT WERE RUNNING AT THE SAME TIME?

WHY WOULD IT BE LIKE THAT?

WHAT DO YOU SUPPOSE IT IS LIKE ON BUSY CITY STREETS WHEN THERE ARE MANY CARS RUNNING?

HOW MANY STROKES OF THE PUMP WOULD IT TAKE YOU TO TURN THE SOLUTION YELLOW IF YOU TESTED THERE?

WHAT WOULD HAPPEN IF YOU RAN THE ENGINE OF YOUR CAN IN A CLOSED PLACE LIKE A GARAGE?

WOULD A CLOSED GARAGE WITH A CAR RUNNING IN IT BE A SAFE PLACE FOR YOU TO BE?

IT IS VERY DANGEROUS FOR A PERSON TO BE IN A CLOSED PLACE AND BREATHE IN CAR EXHAUST FOR A LONG PERIOD OF TIME. PEOPLE CAN DIE FROM BREATHING IN TOO MUCH CAR EXHAUST. YOU SHOULD ALWAYS HAVE THE GARAGE DOOR OR WINDOW OPEN IF YOU ARE IN A CAR AND THE CAR IS RUNNING INSIDE A GARAGE.

WOULD YOU RATHER BE CLOSE OR FAR AWAY FROM A LOT OF CARS THAT ARE RUNNING?

ARE THESE EXHAUST FUMES WE'VE BEEN TALKING ABOUT POLLUTION?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
IT BE LIKE IF ALL OF THE CARS IN THE T WERE RUNNING AT THE SAME TIME?	--respond, "Smelly," "Really bad," "There would be lots of fumes in the air."
IT BE LIKE THAT?	--respond, "There would be too many fumes in the air," "They would not blow away as fast."
U SUPPOSE IT IS LIKE ON BUSY CITY EN THERE ARE MANY CARS RUNNING?	--infer that too much pollution in one place may not be readily absorbed by the environment and respond, "There would be lots of fumes in the air," "It would be really bad."
TROKES OF THE PUMP WOULD IT TAKE YOU E SOLUTION YELLOW IF YOU TESTED THERE?	--respond, "Just a few," "Only one."
HAPPEN IF YOU RAN THE ENGINE OF N A CLOSED PLACE LIKE A GARAGE?	--respond, "The garage would fill up with fumes," "It would not blow away," "The fumes would stay in the air."
OSED GARAGE WITH A CAR RUNNING IN IT PLACE FOR YOU TO BE?	--respond, "No," "We would have to breathe in all those fumes."
DANGEROUS FOR A PERSON TO BE IN A CE AND BREATHE IN CAR EXHAUST FOR IOD OF TIME. PEOPLE CAN DIE FROM IN TOO MUCH CAR EXHAUST. YOU SHOULD E THE GARAGE DOOR OR WINDOW OPEN IF A CAR AND THE CAR IS RUNNING INSIDE	
RATHER BE CLOSE OR FAR AWAY FROM A S THAT ARE RUNNING?	--indicate that they would rather be far away.
EXHAUST FUMES WE'VE BEEN TALKING ABOUT	--respond, "Yes," "Of course."

MATERIALS

TEACHING STRATEGIES

WHAT IS POLLUTION?

DO EXHAUST FUMES REALLY BELONG ANYWHERE?

GIVE S
STUDENT
TO RE

CHANGE

Change of Pacers 39, 40, and 41.

TEACHING STRATEGIES

LUTION?

FUMES REALLY BELONG ANYWHERE?

39, 40, and 41.

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

CHANGE OF PACER

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recall from Activity 5-20 that pollution is something that doesn't normally belong there, something that is out of place.

--probably indicate that there is really no place that exhaust fumes belong.

Upon completion of this activity, each student should, as a minimum:

--have collected and tested fumes in the air at one, two, three, and four feet from the source of the exhaust.
--have concluded that the farther away from a running car a person is, the better the air will be.
--have concluded that pollution is something in the air that shouldn't be there.

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE G
ACTIVITY 5-33

Teacher ____________

Activity name suggested by class:

BSCS USE: Post ___ Tally ___ Rev ___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐No ☐Yes Obtained by you? ☐No ☐Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐No ☐Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐Yes ☐No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐Yes ☐No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐Worthwhile --keep as is
☐Of value--needs the revision suggested
☐Worth salvaging--make major changes described
☐Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Were the students able to successfully carry out the experiment to test the diffusion of the exhaust? ☐Yes ☐No Comment.

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Were the students able to successfully carry out the experiment to test the diffusion of the exhaust? ☐ Yes ☐ No Comment.

13. Did the students have any difficulties in graphing the number of strokes for each distance from the exhaust pipe? ☐ Yes ☐ No

14. Were all the students able to infer that the farther away from a running car one gets, the better the air will be? ☐ Yes ☐ No

UNIT V, CORE G
ACTIVITY 5-33

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

BSCS Evaluation: EMH Feedback Form 1c

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student

5. Recognize the impact of water pollution.
7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

Core G Objectives for the Student:

1. Establish that substances are added to natural air because of man's activities.
2. Establish that an additive need not be seen to be present.
3. Establish that some things added to air are harmful to living things.

ENVIRONMENTAL THEME:
Complementarity of Organisms and Environment

INQUIRY SKILLS:
Translating, Value Judging

PROBLEM-SOLVING SKILLS:
Interpreting Results

PRACTICAL APPLICATION:
Using Data, Making Value Judgments

ACTIVITY

Goals for the Student

5. Recognize the impact of water pollution.

7. Understand the composition of air.

8. Realize that the quality of air is variable.

9. Realize that substances are continually added to air.

C. Comprehend the impact of air pollution on our environment.

G Objectives for the Student:

1. Establish that substances are added to natural air because of man's activities.

2. Establish that an additive need not be seen to be present.

3. Establish that some things added to air are harmful to living things.

TAL THEME:
ementarity of Organisms and Environment

ILLS:
lating, Value Judging

LVING SKILLS:
preting Results

APPLICATION:
Data, Making Value Judgments

BSCS

UNIT V.	AIR AND WATER IN MY ENVIRONMENT
CORE G.	ADDITIVES IN OUR AIR
ACTIVITY 5-34.	CLUES TO SUCCESS: UNDERSTANDING

ACTIVITY
5-34

MATERIALS

Slides 5-66 through 5-70
Worksheet 5-18; A, B, C, D, E
*Huge box
*Various art materials
*Tape recorder(s)
*Blank tape(s)
*35 mm Slide projector

Worksheet 5-18 (Cover)

AIR IN THE ENVIRONMENT

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-34. Clues to Success: Understanding

The purpose of this activity is to help students discove how much they have learned about air in this unit. Part I, Worksheet 5-18, assesses concepts and higher level inquiry and problem-solving skills. Part II provides an opportunity for students to be creative and to apply environmental concerns about air and water to their daily lives.

Part I.

Begin this activity by telling students that they are going to use some of the things they have been learning about to answer questions in a booklet. Remind them to put their names and the date on the booklet and to look only at their own work.

DISTRIB

Discuss the cover and have a student read the title. Direct the students' attention to Questions 1 and 2. Read and repeat the questions. Allow adequate time for students to examine the graph.

Read and repeat Questions 3 and 4. Draw attention to th results of both groups on Day 6 (i.e., one plant in Grou 1 is dead and all plants in Group 2 are dead. Circulate around the room to be sure students are responding to the right question.

TEACHING STRATEGIES

Clues to Success: Understanding

f this activity is to help students discover have learned about air in this unit. heet 5-18, assesses concepts and higher and problem-solving skills. Part II pportunity for students to be creative and ronmental concerns about air and water to ives.

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DISTRIBUTE MATERIALS

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t Questions 3 and 4. Draw attention to the h groups on Day 6 (i.e., one plant in Group all plants in Group 2 are dead. Circulate m to be sure students are responding to tion.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--complete Worksheet 5-18.
--defend his choices.
--make value judgments about air and water pollution.
--participate in making a class television show.

Students should:

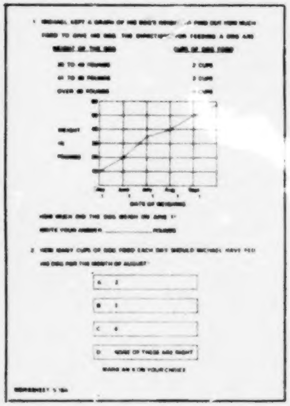
--write their names and the date on the cover.

--write 20 in the blank for Question 1.
--mark an X on B for Question 2.

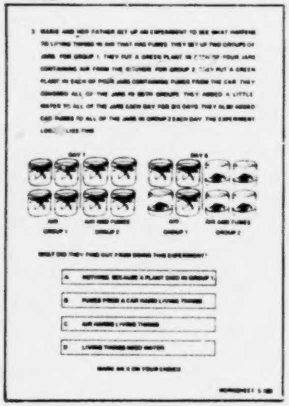
--mark an X on B for Question 3.
--mark an X on B and/or D for Question 4.

MATERIALS

Slide 5-66, Worksheet 5-18A



Slide 5-67, Worksheet 5-18B



TEACHING STRATEGIES

Read and repeat Question 5, checking that students are writing yes or no for each statement.

Read and repeat Question 6.

Read and repeat Question 7. This is a difficult question. Allow plenty of time for the students to respond. Encourage them to think hard about each choice.

Say:

> FOR QUESTIONS 8 THROUGH 12 YOU WILL NEED TO THINK OF WHAT YOU WOULD DO. DO NOT TRY TO PICK A "RIGHT ANSWER." WE WILL TALK ABOUT YOUR CHOICES AFTER WE FINISH.

Assist students as necessary so they are able to follow this type of question format.

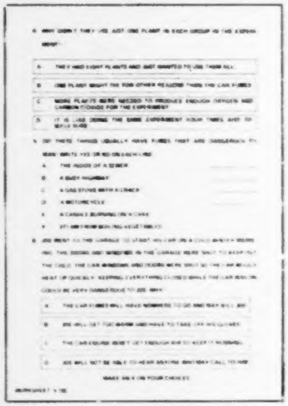
Collect the booklets. Project Slides 5-66 to 5-70 and read the questions again. Have the students explain and discuss the choices they marked as well as why they did not mark other choices. When possible, have students clear up misunderstandings for other students.

Of particular importance for discussion are the choices in Questions 8-12 relating air and water concepts to value judging. Encourage the students to respond honestly, while pointing out the difficulty of doing what is best for the environment.

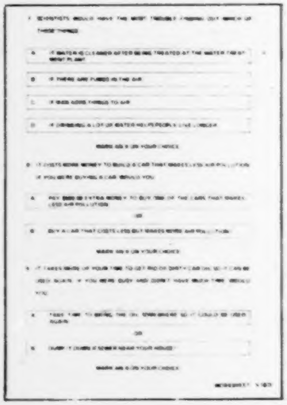
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
Question 5, checking that students are o for each statement.	--write their answers to each statement: A. Yes B. Yes C. Yes D. Yes E. No F. No
Question 6.	--mark an X on A.
Question 7. This is a difficult question. time for the students to respond. o think hard about each choice.	--mark an X on D.
NS 8 THROUGH 12 YOU WILL NEED TO LT YOU WOULD DO. DO NOT TRY TO IT ANSWER." WE WILL TALK ABOUT S AFTER WE FINISH.	--mark an X on their choices for Questions 8-12.
s necessary so they are able to follow tion format.	--continue to make value judgments on air and water pollution.
ets. Project Slides 5-66 to 5-70 and s again. Have the students explain and es they marked as well as why they did oices. When possible, have students standings for other students.	--explain and defend their choices for each question.
ortance for discussion are the choices relating air and water concepts to ncourage the students to respond ointing out the difficulty of doing the environment.	

MATERIALS

Slide 5-68, Worksheet 5-18C



Slide 5-69, Worksheet 5-18D



TEACHING STRATEGIES

Complete Tallysheet 5-9 and send it to BSCS. Directions are given on the tallysheet for scoring and recording results in the Student Record of Progress.

Interpretation and Scoring:

Question 1 provides a guideline for you to determine if a student is able to read a graph. Provide additional practice in constructing and reading graphs for students who answered this question incorrectly.

Question 2 requires a student to translate what is on th graph and apply it to data on the feeding chart. Studen who completed 1 correctly but missed 2 need experiences in applying data.

Question 3 assesses a student's understanding that fumes can be harmful to living things. Review Activity 5-32 a necessary with students who have difficulty. In additio this question assesses the higher level problem-solving skills of interpreting results and drawing conclusions. Students are expected to decide that other variables may have caused one plant in Group 1 to die and that, overal it was the fumes that caused the living things in Group to die. This is a very difficult problem. Students who experienced difficulty will continue to require many experiences to be able to answer questions involving thi level of problem-solving skill.

Question 4 assesses a students' understanding of the need to control for other variables. This may be a

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

HAVE YOU
INVOLVED
ALL
STUDENTS?

sheet 5-9 and send it to BSCS. Directions
he tallysheet for scoring and recording
Student Record of Progress.

and Scoring:

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assesses the higher level problem-solving
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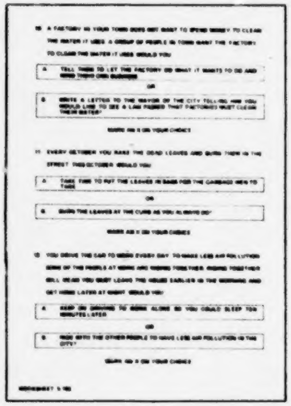
es that caused the living things in Group 2
is a very difficult problem. Students who
fficulty will continue to require many
be able to answer questions involving this
em-solving skill.

esses a students' understanding of the
l for other variables. This may be a

MATERIALS

Slide 5-70, Worksheet 5-18E



TEACHING STRATEGIES

difficult question for many students. Help the students to understand the need for controlling for other variables in an experiment.

Questions 5 and 6 assess understanding of the concept that fumes are dangerous to man. This information has very practical knowledge for survival. Refer to Activities 5-31 and 5-32 for students who need additional help.

Question 7 assesses higher problem-solving skills. Each choice must be considered and thought of in terms of identifying variables and speculating on how to set up an experiment. The first three choices will be relatively easy to consider since students can relate class experiences to each choice. The last choice will be the most difficult to consider, particularly in conceptualizing the difficulty of controlling variables in human activity. Many of your students will be unable to respond correctly, but praise their efforts and continue to provide problem-solving opportunities as they arise.

Questions 8-12 are indicators that involve personal value judgments of the time, money, and effort involved in decisions on air and water pollution. The items focus on the importance of personal decision making. It may be fun to quiz yourself on each of the items and relate the items to your personal behavior over the last six months!

Part II.

This part of the assessment is designed to culminate the unit. It encourages student creativity and divergent production. You may go as far as you have time for with this activity.

Obtain a huge box and make the necessary alterations to convert it to a television screen. If wood and tools

TEACHING STRATEGIES

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6 assess understanding of the concept dangerous to man. This information has knowledge for survival. Refer to and 5-32 for students who need additional

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ox and make the necessary alterations to television screen. If wood and tools

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

are available, you may suggest that some of your students make the television screen "from scratch."

Whichever type of screen is available, make provision for two round holders that will hold the two ends of t roll of "TV film."

Have the cassette recorder and some blank tapes availa for taping music, poems, and other sound materials to accompany the visual presentation.

The topic of the class TV show centers around this question: Is there anything you, your parents, family and friends can do to make the environment better?

The materials present in the room and your own enthusiasm should help to generate an exciting result.

Instruct each student to make several pictures, poster poems, and so on to answer the central question. Tape the pictures together to make one long roll. You may wish to mark various sections to the film such as: Part I, Water; Part II, Air; or Ways I can Make the Environment Better; Ways My Family Can Make the Environment Better.

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Tell students that their production will need an audience. Elicit ideas of persons they would like to invite. Have students write invitations or mimeograph a letter.

TEACHING STRATEGIES

you may suggest that some of your
he television screen "from scratch."

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ENCOURAGE
CREATIVE
IDEAS

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it ideas of persons they would like to
tudents write invitations or mimeograph

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES
	If possible, have a party the day of the show. Congratulate students for their efforts and point out how much they have learned about air and water.

TEACHING STRATEGIES

ve a party the day of the show.
udents for their efforts and point out
ave learned about air and water.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--have completed Worksheet 5-18.*
- *--have defended some of his choices.*
- *--have discussed value judgments about air and water pollution.*
- *--have contributed to the class television production.*

MATERIALS	TEACHING STRATEGIES

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

UNIT V, CORE G
ACTIVITY 5-34

Teacher ____________

Activity name suggested by class:

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. Did the "TV" activity work out well? ☐ Yes ☐ No Comment.

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Did the "TV" activity work out well? ☐ Yes ☐ No Comment.

13. Did all students participate in the "TV" activity? ☐ Yes ☐ No

14. What comments do you have about the assessment of the air section of the unit?

15. Complete and send Tallysheet 5-9 to BSCS.

Side A

UNIT V, CORE G
ACTIVITY 5-34

Teacher ________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Understanding the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
4. Realize the problems associated with the disposal of waste water.
5. Recognize the impact of water pollution.
6. Understand the broad problems of water management.
7. Understand the composition of air.
8. Realize that the quality of air is variable.
9. Realize that substances are continually added to air.
10. Comprehend the impact of air pollution on our environment.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Interpreting Results

PRACTICAL APPLICATION:

Using What Has Been Learned

ACTIVITY

Goals for the Student:
1. Understanding the need for water.
2. Recognize the sources of water.
3. Realize the problems associated with the preparation of usable water.
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TAL THEME:
relationships of Environmental Components

ILLS:
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LVING SKILLS:
reting Results

PPLICATION:
What Has Been Learned

BSCS

UNIT V. AIR AND WATER IN MY ENVIRONMENT

ACTIVITY 5-35. WHAT DO YOU THINK?

MATERIALS

Slides 5-29 through 5-34
Slides 5-71 through 5-79
Worksheets 5-19 through 5-23
Chart 5-2
*35 mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 5-35. What Do You Think?

This activity reviews the variety of things students hav done in Unit V. It provides an indication of the students' interest in science and identifies those activities that were most popular. Some major skills and concepts are assessed to provide an indication of the students' understanding of this unit. A repeat of favorite activities and a review of difficult concepts then follows. Student responses are scored and recorded in the Student Record of Progress *as a summary of each student's progress in Unit V.*

Part I. (First Day)

Distribute Worksheet 5-19 and say:

> WE HAVE DONE A GREAT MANY THINGS IN SCIENCE THIS YEAR. LET'S LOOK BACK AT SOME OF THE THINGS WE HAVE DONE. AS I READ THE DESCRIPTION OF AN ACTIVITY WE DID, MARK WHETHER YOU LIKED IT, WERE NOT INTERESTED, DISLIKED IT, OR DON'T REMEMBER IT. FOR SOME ACTIVITIES, YOU WILL HAVE A CHANCE TO SHOW WHAT YOU LEARNED. AFTER WE FINISH THE WORKSHEET, YOU WILL HAVE A CHANCE TO TALK ABOUT THE ACTIVITIES, AND WE CAN DO SOME OF THEM AGAIN IF YOU WOULD LIKE.

The activities listed on Worksheets 5-19, 5-20, 5-21, 5-22, and 5-23 do not correspond to the numbering of activities in the Teacher's Guide. Some activities have been combined. Clues to Success are not listed. Each of the following worksheet activities is keyed to the Guide. Read the brief description of each activity that is on the worksheet to remind students of the activity. Be sure to add comments calling upon personal experiences in your class. If you wish to dramatize the activities, you could set up and display some equipment used in the activity. For example, the equal-arm balance and food slices could be set up. If you do this, be sure to make a sign to identify it, using the same label that appears on Worksheet 5-19.

TEACHING STRATEGIES

What Do You Think?

reviews the variety of things students have . It provides an indication of the rest in science and identifies those t were most popular. Some major skills re assessed to provide an indication of understanding of this unit. A repeat tivities and a review of difficult follows. Student responses are scored and e Student Record of Progress *as a summary t's progress in Unit V.*

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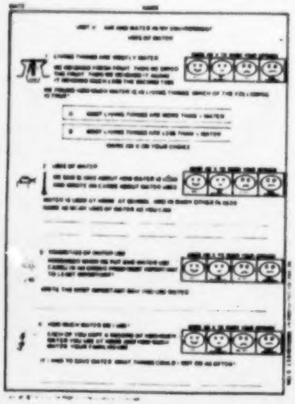
ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--recall each described activity in Unit V and rate his opinion of it.
--answer each of the questions on Worksheet 5-19, 5-20, 5-21, 5-22, and 5-23.
--review the questions on Worksheets 5-19, 5-20, 5-21, 5-22, and 5-23.
--repeat selected activities.

MATERIALS

Slide 5-71, Worksheet 5-19A



TEACHING STRATEGIES

Now project Slide 5-71 of Worksheet 5-19A and explain what the student will be doing and how they should mark their opinions and answer the questions.

Have the students begin the worksheets by finding the side that starts with "1. Living Things Are Mostly Water." Have them put the date and their names on the worksheets.

Turn off the projector.

Then say:

> AT THE FIRST OF THE YEAR WE STARTED INVESTIGATING WATER IN OUR ENVIRONMENT. HOW MANY REMEMBER WEIGHING FOOD SLICES BEFORE AND AFTER THEY WERE DRIED?

1. (Activity 5-3) Living Things Are Mostly Water.

> WE WEIGHED FRESH FRUIT. THEN WE DRIED THE FRUIT. THEN WE WEIGHED IT AGAIN. IT WEIGHED MUCH LESS THE SECOND TIME.
>
> WHAT WAS YOUR OPINION OF THAT ACTIVITY? MARK AN X ON THE RIGHT SIDE OF YOUR PAPER TO SHOW IF YOU LIKED IT, IF YOU WERE NOT INTERESTED, IF YOU DISLIKED IT, OR IF YOU DON'T REMEMBER THAT ACTIVITY. IF YOU WERE ABSENT, YOU MIGHT HAVE MISSED SOME OF THESE ACTIVITIES.
>
> NOW LET'S TEST YOUR MEMORY. CHOOSE THE CORRECT ANSWER TO QUESTION 1. WE FOUND HOW MUCH WATER IS IN LIVING THINGS. WHICH OF THE FOLLOWING IS TRUE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
e 5-71 of Worksheet 5-19A and explain will be doing and how they should mark nd answer the questions.	
s begin the worksheets by finding the with "1. Living Things Are Mostly em put the date and their names on the	--write their names and the date on the worksheets.
jector.	
T OF THE YEAR WE STARTED INVESTI- R IN OUR ENVIRONMENT. HOW MANY IGHING FOOD SLICES BEFORE AND ERE DRIED?	--respond by raising hands.
-3) Living Things Are Mostly Water.	
RESH FRUIT. THEN WE DRIED THE FRUIT. HED IT AGAIN. IT WEIGHED MUCH LESS IME.	
R OPINION OF THAT ACTIVITY? MARK RIGHT SIDE OF YOUR PAPER TO SHOW IT, IF YOU WERE NOT INTERESTED, KED IT, OR IF YOU DON'T REMEMBER Y. IF YOU WERE ABSENT, YOU MIGHT SOME OF THESE ACTIVITIES.	--mark X's in the appropriate columns to indicate their opinions.
ST YOUR MEMORY. CHOOSE THE ER TO QUESTION 1. WE FOUND ER IS IN LIVING THINGS. WHICH WING IS TRUE?	

MATERIALS

TEACHING STRATEGIES

A. MOST LIVING THINGS ARE MORE THAN ONE-HALF WATER.

OR

B. MOST LIVING THINGS ARE LESS THAN ONE-HALF WATER.

MARK AN X ON YOUR CHOICE.

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If necessary, direct students not to share their answers until the worksheets have been completed.

2. (Activity 5-4) Uses of Water.

WE SAW SLIDES ABOUT HOW WATER IS USED AND WROTE ON CARDS ABOUT WATER USES. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

LET'S SEE HOW MANY WATER USES YOU CAN REMEMBER. IN THE SPACE BELOW QUESTION 2, NAME AS MANY USES OF WATER AS YOU CAN.

Assist students with spelling as necessary.

TEACHING STRATEGIES

MOST LIVING THINGS ARE MORE THAN ONE-HALF WATER.

OR

MOST LIVING THINGS ARE LESS THAN ONE-HALF WATER.

X ON YOUR CHOICE.

GIVE STUDENTS
TIME
TO
THINK

direct students not to share their
the worksheets have been completed.

5-4) Uses of Water.

LIDES ABOUT HOW WATER IS USED AND
CARDS ABOUT WATER USES. MARK AN
YOUR OPINION OF THIS ACTIVITY.

HOW MANY WATER USES YOU CAN REMEMBER.
ACE BELOW QUESTION 2, NAME AS MANY
ATER AS YOU CAN.

s with spelling as necessary.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark an X on Answer A.

--mark X's in the appropriate columns to indicate their opinions.

--list as many water uses as they can think of.

MATERIALS

TEACHING STRATEGIES

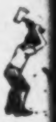
3. (Activity 5-5) Priorities of Water Use.

REMEMBER WHEN WE PUT OUR WATER USE CARDS IN AN ORDER FROM MOST IMPORTANT TO LEAST IMPORTANT?

MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

CAN YOU REMEMBER WHAT SOME OF THE MOST IMPORTANT WATER USES ARE? WRITE THE MOST IMPORTANT WAY YOU USE WATER UNDER QUESTION 3.

Assist students with spelling as necessary.



4. (Activity 5-6) How Much Water Do I Use?

IN THIS ACTIVITY EACH OF YOU KEPT A RECORD OF HOW MUCH WATER YOU USE AT HOME AND HOW MUCH WATER YOUR FAMILIES USE.

MARK AN X ON YOUR WORKSHEET TO SHOW YOUR OPINION OF THIS ACTIVITY.

IF WE HAD A WATER SHORTAGE AND HAD TO SAVE WATER, WHAT THINGS COULD WE NOT DO AS OFTEN? WRITE YOUR ANSWER UNDER QUESTION 4.

EACHING STRATEGIES

5) Priorities of Water Use.

N WE PUT OUR WATER USE CARDS IN AN
OST IMPORTANT TO LEAST IMPORTANT?

SHOW YOUR OPINION OF THIS ACTIVITY.

MBER WHAT SOME OF THE MOST IMPORTANT
RE? WRITE THE MOST IMPORTANT WAY
R UNDER QUESTION 3.

th spelling as necessary.

) How Much Water Do I Use?

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UR FAMILIES USE.

YOUR WORKSHEET TO SHOW YOUR
IS ACTIVITY.

ATER SHORTAGE AND HAD TO SAVE
HINGS COULD WE NOT DO AS OFTEN?
SWER UNDER QUESTION 4.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark X's in the appropriate columns to indicate their opinions.

--write the most important way they use water.

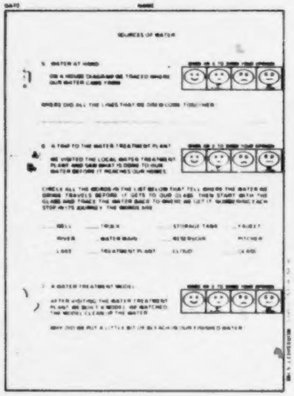
--mark X's in the appropriate opinion columns.

--write ways to save water that include stopping lawn watering, carwashing, automatic dishwashing, or other activities that use large amounts of water.

ACTIVITY
5-35

MATERIALS

Slide 5-72, Worksheet 5-19B



TEACHING STRATEGIES

5. (Activity 5-7) Water at Hand.

REMEMBER THE HOUSE DIAGRAMS? ON A HOUSE DIAGRAM WE TRACED WHERE OUR WATER CAME FROM. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

NOW LOOK AT QUESTION 5. IT ASKS, "WHERE DID ALL THE LINES THAT WE DREW COME TOGETHER?" WRITE YOUR ANSWER IN THE SPACE.

6. (Activity 5-8) A Trip to the Water Treatment Plant.

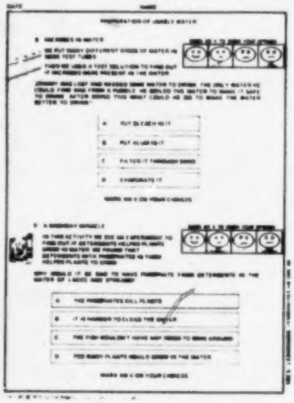
REMEMBER OUR FIELD TRIP? WE VISITED THE WATER TREATMENT PLANT AND SAW WHAT IS DONE TO OUR WATER BEFORE IT REACHES OUR HOMES. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

CIRCLE ALL THE WORDS IN THE LIST BELOW THAT TELL WHERE THE WATER WE DRINK TRAVELS BEFORE IT GETS TO OUR GLASS. THEN START WITH THE GLASS AND TRACE THE WATER BACK TO WHERE WE GET IT, NUMBERING EACH STEP IN IT'S JOURNEY. THE WORDS ARE WELL, RIVER, LAKE, TRUCK, WATER MAIN, TREATMENT PLANT, STORAGE TANK, RESERVOIR, CLOUD, FAUCET, PITCHER, AND GLASS.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
5-7) Water at Hand. HE HOUSE DIAGRAMS? ON A HOUSE DIAGRAM WHERE OUR WATER CAME FROM. MARK AN YOUR OPINION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
T QUESTION 5. IT ASKS, "WHERE DID NES THAT WE DREW COME TOGETHER?" ANSWER IN THE SPACE.	--write an answer such as main water pipe, water main, water hookup, water pipe, and so on.
5-8) A Trip to the Water Treatment Plant. UR FIELD TRIP? WE VISITED THE WATER PLANT AND SAW WHAT IS DONE TO OUR RE IT REACHES OUR HOMES. MARK AN YOUR OPINION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
THE WORDS IN THE LIST BELOW THAT THE WATER WE DRINK TRAVELS BEFORE OUR GLASS. THEN START WITH THE TRACE THE WATER BACK TO WHERE WE MBERING EACH STEP IN IT'S JOURNEY. ARE WELL, RIVER, LAKE, TRUCK, WATER TMENT PLANT, STORAGE TANK, RESERVOIR, CET, PITCHER, AND GLASS.	--choose the following words from the list: well, river, or lake; treatment plant; storage tank or reservoir; faucet or pitcher. Number the glass as first, the treatment plant in between the glass and the natural source, and a natural source (well, river, or lake) as last. (All other circled and numbered words may be disregarded.)

MATERIALS

Slide 5-73, Worksheet 5-20A



TEACHING STRATEGIES

7. (Activity 5-9) A Water Treatment Plant Model.

AFTER VISITING THE WATER TREATMENT PLANT, WE BUILT A MODEL. WE WATCHED THE MODEL CLEAN UP THE WATER. MARK AN X TO SHOW WHETHER YOU LIKED THIS ACTIVITY, WERE NOT INTERESTED, DISLIKED IT, OR DON'T REMEMBER IT.

LOOK AT QUESTION 7. WHY DID WE PUT A LITTLE BIT OF BLEACH IN OUR FINISHED WATER? WRITE YOUR ANSWER IN THE SPACE.

Collect Worksheet 5-19. Distribute Worksheet 5-20 and have students put their names and the date at the top. Then continue with Question 8.

8. (Activity 5-12) Microbes in Water.

IN THIS ACTIVITY WE PUT MANY DIFFERENT KINDS OF WATER IN SOME TEST TUBES. THEN WE USED A TEST SOLUTION TO FIND OUT IF MICROBES WERE PRESENT IN THE WATER. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

QUESTION 8 TELLS ABOUT JOHNNY AND A PROBLEM HE HAD. JOHNNY WAS LOST AND NEEDED SOME WATER TO DRINK. THE ONLY WATER HE COULD FIND WAS FROM A PUDDLE. HE BOILED THE WATER TO MAKE IT SAFE TO DRINK. AFTER DOING THIS, WHAT ELSE COULD HE DO TO MAKE THE WATER BETTER TO DRINK?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
-9) A Water Treatment Plant Model.	
ING THE WATER TREATMENT PLANT, WE EL. WE WATCHED THE MODEL CLEAN UP MARK AN X TO SHOW WHETHER YOU ACTIVITY, WERE NOT INTERESTED, , OR DON'T REMEMBER IT.	--mark X's in the appropriate opinion columns.
STION 7. WHY DID WE PUT A LITTLE CH IN OUR FINISHED WATER? WRITE IN THE SPACE.	--write "To kill microbes" in the space.
t 5-19. Distribute Worksheet 5-20 and t their names and the date at the top. th Question 8.	
-12) Microbes in Water.	
IVITY WE PUT MANY DIFFERENT KINDS OF E TEST TUBES. THEN WE USED A TEST FIND OUT IF MICROBES WERE PRESENT IN MARK AN X TO SHOW YOUR OPINION OF TY.	--mark X's in the appropriate opinion columns.
ELLS ABOUT JOHNNY AND A PROBLEM NNY WAS LOST AND NEEDED SOME WATER HE ONLY WATER HE COULD FIND WAS FROM E BOILED THE WATER TO MAKE IT SAFE FTER DOING THIS, WHAT ELSE COULD HE HE WATER BETTER TO DRINK?	

MATERIALS

TEACHING STRATEGIES

A. PUT BLEACH IN IT.

B. PUT ALUM IN IT.

C. FILTER IT THROUGH SAND.

D. EVAPORATE IT.

MARK AN X ON YOUR CHOICES.

9. (Activity 5-13) A Washday Miracle.

IN THIS ACTIVITY WE DID AN EXPERIMENT TO FIND OUT IF DETERGENTS HELPED PLANTS GROW IN WATER. WE FOUND THAT DETERGENTS WITH PHOSPHATES IN THEM HELPED PLANTS TO GROW. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

QUESTION 9 ASKS, "WHY WOULD IT BE BAD TO HAVE PHOSPHATES FROM DETERGENTS IN THE WATER OF LAKES AND STREAMS?"

A. THE PHOSPHATES KILL PLANTS.

B. IT IS HARDER TO CLEAN THE WATER.

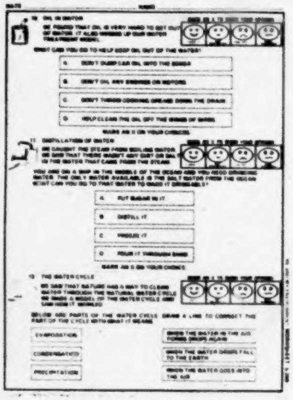
C. THE FISH WOULDN'T HAVE ANY ROOM TO SWIM AROUND.

D. TOO MANY PLANTS WOULD GROW IN THE WATER.

MARK AN X ON YOUR CHOICES.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
PUT BLEACH IN IT.	
PUT ALUM IN IT.	
FILTER IT THROUGH SAND.	
EVAPORATE IT.	
ON YOUR CHOICES.	--each mark an X on B, C, or D.
5-13) A Washday Miracle.	
CTIVITY WE DID AN EXPERIMENT TO FIND TERGENTS HELPED PLANTS GROW IN WATER. THAT DETERGENTS WITH PHOSPHATES IN ED PLANTS TO GROW. MARK AN X TO SHOW ION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
ASKS, "WHY WOULD IT BE BAD TO HAVE FROM DETERGENTS IN THE WATER OF STREAMS?"	
THE PHOSPHATES KILL PLANTS.	
IT IS HARDER TO CLEAN THE WATER.	
THE FISH WOULDN'T HAVE ANY ROOM TO SWIM AROUND.	
TOO MANY PLANTS WOULD GROW IN THE WATER.	
ON YOUR CHOICES.	--each mark an X on answer B and/or D.

Slide 5-74, Worksheet 5-20B



10. (Activity 5-14) Oil in Water.

REMEMBER THE OILY WATER WE HAD? WE FOUND THAT OIL IS VERY HARD TO GET OUT OF WATER. IT ALSO MESSED UP OUR WATER TREATMENT MODEL. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT CAN YOU DO TO HELP KEEP OIL OUT OF THE WATER?

A. DON'T DUMP CAR OIL INTO THE SEWER.

B. DON'T OIL ANY ENGINES OR MOTORS.

C. DON'T THROW COOKING GREASE DOWN THE DRAIN.

D. HELP CLEAN THE OIL OFF THE WINGS OF BIRDS.

MARK AN X ON YOUR CHOICES.

11. (Activity 5-15) Distillation of Water.

WE CAUGHT THE STEAM FROM BOILING WATER IN THIS ACTIVITY. WE SAW THAT THERE WASN'T ANY DIRT OR SALT IN THE WATER THAT CAME FROM THE STEAM.

MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

SEE IF YOU CAN SOLVE THIS PROBLEM. YOU ARE ON A SHIP IN THE MIDDLE OF THE OCEAN AND YOU NEED DRINKING WATER. THE ONLY WATER AVAILABLE IS THE SALT WATER FROM THE OCEAN.

WHAT CAN YOU DO TO THAT WATER TO MAKE IT DRINKABLE?

A. PUT SUGAR IN IT.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
5-14) Oil in Water.	
HE OILY WATER WE HAD? WE FOUND THAT HARD TO GET OUT OF WATER. IT ALSO OUR WATER TREATMENT MODEL. MARK AN YOUR OPINION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
U DO TO HELP KEEP OIL OUT OF THE	
N'T DUMP CAR OIL INTO THE SEWER.	
N'T OIL ANY ENGINES OR MOTORS.	
N'T THROW COOKING GREASE DOWN THE AIN.	
LP CLEAN THE OIL OFF THE WINGS OF RDS.	
N YOUR CHOICES.	--each mark an X on answers A and C.
-15) Distillation of Water.	
HE STEAM FROM BOILING WATER IN THIS WE SAW THAT THERE WASN'T ANY DIRT THE WATER THAT CAME FROM THE STEAM.	
O SHOW YOUR OPINION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
CAN SOLVE THIS PROBLEM. YOU ARE ON HE MIDDLE OF THE OCEAN AND YOU NEED TER. THE ONLY WATER AVAILABLE IS TER FROM THE OCEAN.	
U DO TO THAT WATER TO MAKE IT	
T SUGAR IN IT.	

B. DISTILL IT.

C. FREEZE IT.

D. POUR IT THROUGH SAND.

MARK AN X ON YOUR CHOICE.

12. (Activity 5-16) The Water Cycle.

REMEMBER THE NATURAL WATER CYCLE? WE SAW THAT NATURE HAS A WAY TO CLEAN WATER THROUGH THE NATURAL WATER CYCLE. WE MADE A MODEL OF THE WATER CYCLE AND SAW HOW IT WORKED. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

LOOK AT QUESTION 12. IT'S A HARD QUESTION SO THINK CAREFULLY. BELOW ARE PARTS OF THE WATER CYCLE. DRAW A LINE TO CONNECT THE PART OF THE CYCLE WITH WHAT IT MEANS.

ON THE LEFT SIDE ARE THE PARTS OF THE WATER CYCLE: EVAPORATION, CONDENSATION, AND PRECIPITATION. ON THE RIGHT SIDE ARE THE MEANINGS:

A. WHEN THE WATER IN THE AIR FORMS DROPS.

B. WHEN THE WATER DROPS FALL TO THE EARTH.

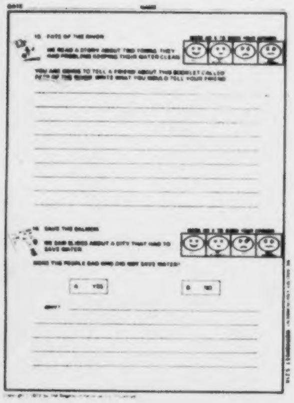
C. WHEN THE WATER GOES INTO THE AIR.

TAKE YOUR TIME.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
DISTILL IT.	
FREEZE IT.	
POUR IT THROUGH SAND.	
ON YOUR CHOICE.	--each mark an X on answer B.
5-16) The Water Cycle.	
THE NATURAL WATER CYCLE? WE SAW RE HAS A WAY TO CLEAN WATER THROUGH AL WATER CYCLE. WE MADE A MODEL OF CYCLE AND SAW HOW IT WORKED. MARK HOW YOUR OPINION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
UESTION 12. IT'S A HARD QUESTION SO EFULLY. BELOW ARE PARTS OF THE LE. DRAW A LINE TO CONNECT THE HE CYCLE WITH WHAT IT MEANS.	
FT SIDE ARE THE PARTS OF THE WATER VAPORATION, CONDENSATION, AND TION. ON THE RIGHT SIDE ARE THE	
WHEN THE WATER IN THE AIR FORMS DROPS.	
WHEN THE WATER DROPS FALL TO THE EARTH.	
WHEN THE WATER GOES INTO THE AIR.	
TIME.	--match evaporation with C, condensation with A, and precipitation with B.

MATERIALS

Slide 5-75, Worksheet 5-21A



TEACHING STRATEGIES

Collect Worksheet 5-20 and distribute 5-21. Direct students to put their names and the date on the worksheet and locate the side that begins with "13. Fate of the River." Continue with Item 13.

13. (Activity 5-17) Fate of the River.

THIS ACTIVITY WAS A BOOKLET. WE READ A STORY ABOUT TWO TOWNS. THEY HAD PROBLEMS KEEPING THEIR WATER CLEAN. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

LOOK AT QUESTION 13. YOU ARE GOING TO TELL A FRIEND ABOUT THE BOOKLET CALLED *FATE OF THE RIVER*. WRITE WHAT YOU WOULD TELL YOUR FRIENDS.

14. (Activity 5-18) Save the Salmon.

IN THIS ACTIVITY WE SAW SLIDES ABOUT A CITY THAT HAD TO SAVE WATER. MARK AN X TO SHOW WHETHER YOU LIKED THIS ACTIVITY, WERE NOT INTERESTED, DISLIKED IT, OR DON'T REMEMBER.

WE KNOW ALL PEOPLE THINK DIFFERENTLY. LOOK AT QUESTION 14. IT ASKS, "WERE THE PEOPLE BAD WHO DID NOT SAVE WATER?" MARK YES OR NO AND THEN TELL WHY YOU ANSWERED THE WAY YOU DID.

NOTE: There is no right answer to this question. Tell the students that when you discuss their answers they will be expected to tell their reasons for choosing A or B.

TEACHING STRATEGIES

t 5-20 and distribute 5-21. Direct
their names and the date on the worksheet
ide that begins with "13. Fate of the
e with Item 13.

-17) Fate of the River.

Y WAS A BOOKLET. WE READ A STORY
WNS. THEY HAD PROBLEMS KEEPING
CLEAN. MARK AN X TO SHOW YOUR
HIS ACTIVITY.

TION 13. YOU ARE GOING TO TELL
UT THE BOOKLET CALLED *FATE OF THE*
E WHAT YOU WOULD TELL YOUR FRIENDS.

18) Save the Salmon.

VITY WE SAW SLIDES ABOUT A CITY
SAVE WATER. MARK AN X TO SHOW
LIKED THIS ACTIVITY, WERE NOT
DISLIKED IT, OR DON'T REMEMBER.

PEOPLE THINK DIFFERENTLY. LOOK
14. IT ASKS, "WERE THE PEOPLE
NOT SAVE WATER?" MARK YES OR NO
WHY YOU ANSWERED THE WAY YOU DID.

o right answer to this question. Tell
ts that when you discuss their answers
be expected to tell their reasons for
or B.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark X's in the appropriate opinion columns.

--write one or two sentences about the booklet.

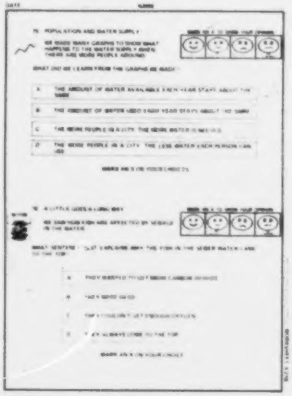
--mark X's in the appropriate opinion columns.

--each mark either yes or no and explain why.

ACTIVITY
5-35

MATERIALS

Slide 5-76, Worksheet 5-21B



TEACHING STRATEGIES

15. (Activity 5-19) Population Versus Water Supply.

REMEMBER ALL THOSE GRAPHS WE MADE? WE MADE MANY GRAPHS TO SHOW WHAT HAPPENS TO THE WATER SUPPLY WHEN THERE ARE MORE PEOPLE AROUND. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT DID WE LEARN FROM THE GRAPHS WE MADE? MARK AN X ON YOUR CHOICES.

A. THE AMOUNT OF WATER AVAILABLE EACH YEAR STAYS ABOUT THE SAME.

B. THE AMOUNT OF WATER USED EACH YEAR STAYS THE SAME.

C. THE MORE PEOPLE IN A CITY, THE MORE WATER IS NEEDED.

D. THE MORE PEOPLE IN A CITY, THE LESS WATER EACH PERSON CAN USE.

16. (Activity 5-20) A Little Goes a Long Way.

REMEMBER THE FISH WE USED IN THIS EXPERIMENT? WE SAW HOW FISH ARE AFFECTED BY SEWAGE IN THE WATER. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT SENTENCE BEST EXPLAINS WHY THE FISH IN THE SEWER WATER CAME TO THE TOP? MARK AN X ON YOUR CHOICE.

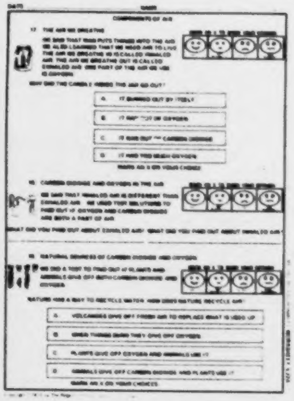
A. THEY WANTED TO GET MORE CARBON DIOXIDE.

B. THEY WERE DEAD.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
y 5-19) Population Versus Water Supply. ALL THOSE GRAPHS WE MADE? WE MADE MANY SHOW WHAT HAPPENS TO THE WATER SUPPLY RE ARE MORE PEOPLE AROUND. MARK AN X OUR OPINION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
WE LEARN FROM THE GRAPHS WE MADE? MARK OUR CHOICES. THE AMOUNT OF WATER AVAILABLE EACH YEAR STAYS ABOUT THE SAME. THE AMOUNT OF WATER USED EACH YEAR STAYS THE SAME. THE MORE PEOPLE IN A CITY, THE MORE WATER IS NEEDED. THE MORE PEOPLE IN A CITY, THE LESS WATER EACH PERSON CAN USE.	--mark X's on answers A, C, and D.
5-20) A Little Goes a Long Way. THE FISH WE USED IN THIS EXPERIMENT? FISH ARE AFFECTED BY SEWAGE IN THE ARK AN X TO SHOW YOUR OPINION OF THIS	--mark X's in the appropriate opinion columns.
ENCE BEST EXPLAINS WHY THE FISH IN WATER CAME TO THE TOP? MARK AN X HOICE. HEY WANTED TO GET MORE CARBON DIOXIDE. HEY WERE DEAD.	

MATERIALS

Slide 5-77, Worksheet 5-22A



TEACHING STRATEGIES

C. THEY COULDN'T GET ENOUGH OXYGEN.

D. THEY ALWAYS COME TO THE TOP.

Collect Worksheet 5-21. Distribute Worksheet 5-22 and have students locate the side which starts with "17. The Air We Breathe." Have them write their names and the date in the spaces provided.

Then say:

> WE HAVE REALLY DONE A LOT OF THINGS WITH WATER! THE SECOND PART OF THE UNIT HAD TO DO WITH AIR. HOW MANY REMEMBER SOME OF THE THINGS WE DID WITH AIR?

17. (Activity 5-22 and 5-23) The Air We Breathe.

> WE SAW THAT MAN PUTS THINGS IN THE AIR. WE ALSO LEARNED THAT WE NEED AIR TO LIVE. THE AIR WE BREATHE IN IS CALLED INHALED AIR. THE AIR WE BREATHE OUT IS CALLED EXHALED AIR. ONE PART OF THE AIR WE USE IS OXYGEN. MARK AN X TO SHOW YOUR OPINION OF THESE ACTIVITIES.
>
> QUESTION 17 ASKS, "WHY DID THE CANDLE INSIDE THE JAR GO OUT?" MARK AN X ON YOUR CHOICE.
>
> A. IT BURNED OUT BY ITSELF.
>
> B. IT RAN OUT OF OXYGEN.
>
> C. IT RAN OUT OF CARBON DIOXIDE.
>
> D. IT HAD TOO MUCH OXYGEN.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
Y COULDN'T GET ENOUGH OXYGEN.	
Y ALWAYS COME TO THE TOP.	--mark X's on answer C.
5-21. Distribute Worksheet 5-22 and ate the side which starts with Breathe." Have them write their names he spaces provided.	
LY DONE A LOT OF THINGS WITH WATER! ART OF THE UNIT HAD TO DO WITH AIR. EMBER SOME OF THE THINGS WE DID WITH	--raise hands to show who remembers.
22 and 5-23) The Air We Breathe.	
MAN PUTS THINGS IN THE AIR. WE THAT WE NEED AIR TO LIVE. THE HE IN IS CALLED INHALED AIR. REATHE OUT IS CALLED EXHALED AIR. THE AIR WE USE IS OXYGEN. MARK YOUR OPINION OF THESE ACTIVITIES.	--mark X's in the appropriate opinion columns.
SKS, "WHY DID THE CANDLE INSIDE THE MARK AN X ON YOUR CHOICE.	
URNED OUT BY ITSELF.	
RAN OUT OF OXYGEN.	
RAN OUT OF CARBON DIOXIDE.	
AD TOO MUCH OXYGEN.	--each mark an X on answer B.

MATERIALS

TEACHING STRATEGIES

18. (Activity 5-24 and 5-25) Carbon Dioxide and Oxygen in the Air.

IN THIS ACTIVITY WE SAW THAT INHALED AIR IS DIFFERENT FROM EXHALED AIR. WE USED TEST SOLUTIONS TO FIND OUT IF OXYGEN AND CARBON DIOXIDE ARE BOTH A PART OF AIR. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

HERE ARE TWO EASY QUESTIONS. WHAT DID YOU FIND OUT ABOUT EXHALED AIR? AND, WHAT DID YOU FIND OUT ABOUT INHALED AIR? WRITE YOUR ANSWERS IN THE SPACES BELOW QUESTION 18.

19. (Activity 5-26) Natural Sources of Carbon Dioxide and Oxygen.

REMEMBER THE SNAIL AND THE PLANT? WE DID A TEST TO FIND OUT IF PLANTS AND ANIMALS GIVE OFF BOTH CARBON DIOXIDE AND OXYGEN. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

YOU'LL HAVE TO THINK HARD ON QUESTION 21. IT SAYS, "NATURE HAS A WAY TO RECYCLE WATER. HOW DOES NATURE RECYCLE AIR?" MARK AN X ON YOUR CHOICES.

A. VOLCANOES GIVE OFF FRESH AIR TO REPLACE WHAT IS USED UP.

B. WHEN THINGS BURN THEY GIVE OFF OXYGEN.

TEACHING STRATEGIES

5-24 and 5-25) Carbon Dioxide and Oxygen

IVITY WE SAW THAT INHALED AIR IS
ROM EXHALED AIR. WE USED TEST
O FIND OUT IF OXYGEN AND CARBON
BOTH A PART OF AIR. MARK AN X
R OPINION OF THIS ACTIVITY.

O EASY QUESTIONS. WHAT DID YOU FIND
XHALED AIR? AND, WHAT DID YOU FIND
NHALED AIR? WRITE YOUR ANSWERS IN
BELOW QUESTION 18.

-26) Natural Sources of Carbon Dioxide

E SNAIL AND THE PLANT? WE DID A
D OUT IF PLANTS AND ANIMALS GIVE
RBON DIOXIDE AND OXYGEN. MARK AN
OUR OPINION OF THIS ACTIVITY.

TO THINK HARD ON QUESTION 21. IT
RE HAS A WAY TO RECYCLE WATER. HOW
RECYCLE AIR?" MARK AN X ON YOUR

LCANOES GIVE OFF FRESH AIR TO
PLACE WHAT IS USED UP.

EN THINGS BURN THEY GIVE OFF
YGEN.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark X's in the appropriate opinion columns.

--write, "It has mostly carbon dioxide in it," and, "It is mostly oxygen."

--mark X's in the appropriate opinion columns.

MATERIALS

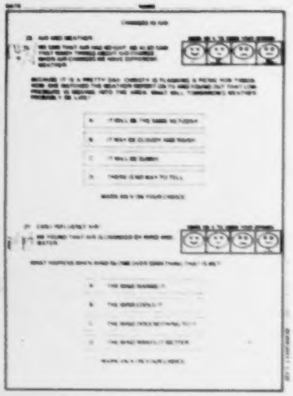
TEACHING STRATEGIES

C. PLANTS GIVE OFF OXYGEN AND ANIMALS USE IT.

D. ANIMALS GIVE OFF CARBON DIOXIDE AND PLANTS USE IT.

GIVE S
TIME
TO
THINK

Slide 5-78, Worksheet 5-22B



20. (Activities 5-27 and 5-28) Air and Weather.

REMEMBER WHEN WE WEIGHED BALLOONS? WE SAW THAT AIR HAS WEIGHT. WE ALSO SAW THAT MANY THINGS ABOUT AIR CHANGE. WHEN THE AIR CHANGES WE HAVE DIFFERENT WEATHER. MARK AN X TO SHOW YOUR OPINION OF THESE ACTIVITIES.

HERE IS A PROBLEM FOR YOU TO FIGURE OUT. QUESTION 22 SAYS, "BECAUSE IT IS A PRETTY DAY, CHRISTY IS PLANNING A PICNIC FOR TOMORROW. SHE WATCHED THE WEATHER REPORT ON TV AND FOUND OUT THAT LOW PRESSURE IS MOVING INTO THE AREA. WHAT WILL TOMORROW'S WEATHER PROBABLY BE LIKE? MARK AN X ON YOUR CHOICE.

A. IT WILL BE THE SAME AS TODAY.

B. IT MAY BE CLOUDY AND RAINY.

C. IT WILL BE SUNNY.

D. THERE IS NO WAY TO TELL.

TEACHING STRATEGIES

LANTS GIVE OFF OXYGEN AND ANIMALS
SE IT.

NIMALS GIVE OFF CARBON DIOXIDE
ND PLANTS USE IT.

s 5-27 and 5-28) Air and Weather.

HEN WE WEIGHED BALLOONS? WE SAW
AS WEIGHT. WE ALSO SAW THAT MANY
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PROBLEM FOR YOU TO FIGURE OUT.
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TY IS PLANNING A PICNIC FOR
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FOUND OUT THAT LOW PRESSURE IS
THE AREA. WHAT WILL TOMORROW'S
BABLY BE LIKE? MARK AN X ON YOUR

WILL BE THE SAME AS TODAY.

MAY BE CLOUDY AND RAINY.

WILL BE SUNNY.

ERE IS NO WAY TO TELL.

GIVE STUDENTS
TIME
TO
THINK

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark X's on answers C and D.

--mark Xs in the appropriate opinion columns.

--each mark an X on answer B.

MATERIALS

TEACHING STRATEGIES

21. (Activity 5-29) Can I Influence Air?

IN THIS ACTIVITY WE FOUND THAT AIR IS CHANGED BY WIND AND WATER. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT HAPPENS WHEN WIND BLOWS OVER SOMETHING THAT IS WET? MARK AN X ON YOUR CHOICE.

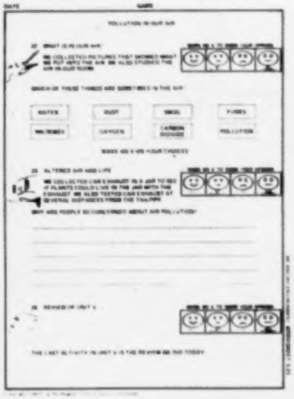
A. THE WIND WARMS IT.

B. THE WIND COOLS IT.

C. THE WIND DOES NOTHING TO IT.

D. THE WIND MAKES IT WETTER.

Slide 5-79, Worksheet 5-23



Collect Worksheet 5-22. Distribute Worksheet 5-23 and have the students locate Number 22, "Pollution in our Air." Have them write their names and the date in the spaces provided.

22. (Activities 5-30 and 5-31) What Is in Our Air?

REMEMBER WHEN WE MADE A BULLETIN BOARD? WE COLLECTED PICTURES THAT SHOWED WHAT WE PUT INTO THE AIR. WE ALSO STUDIED THE AIR IN OUR ROOM. MARK AN X TO SHOW YOUR OPINION OF THESE ACTIVITIES.

WE FOUND MANY DIFFERENT THINGS IN THE AIR. WHICH OF THESE THINGS ARE SOMETIMES IN THE AIR? MARK AN X ON YOUR CHOICES.

WATER
DUST
SMOG
FUMES

MICROBES
OXYGEN
CARBON DIOXIDE
POLLUTION

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
5-29) Can I Influence Air?	
TIVITY WE FOUND THAT AIR IS CHANGED D WATER. MARK AN X TO SHOW YOUR THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
NS WHEN WIND BLOWS OVER SOMETHING T? MARK AN X ON YOUR CHOICE.	
HE WIND WARMS IT.	
HE WIND COOLS IT.	
HE WIND DOES NOTHING TO IT.	
HE WIND MAKES IT WETTER.	--each mark X on answer B.
et 5-22. Distribute Worksheet 5-23 and ts locate Number 22, "Pollution in our m write their names and the date in the .	
s 5-30 and 5-31) What Is in Our Air?	
HEN WE MADE A BULLETIN BOARD? WE PICTURES THAT SHOWED WHAT WE PUT IR. WE ALSO STUDIED THE AIR IN MARK AN X TO SHOW YOUR OPINION CTIVITIES.	--mark X's in the appropriate opinion columns.
ANY DIFFERENT THINGS IN THE AIR. HESE THINGS ARE SOMETIMES IN THE AN X ON YOUR CHOICES.	
MICROBES OXYGEN CARBON DIOXIDE POLLUTION	--mark X's on all choices.

MATERIALS

TEACHING STRATEGIES

23. (Activities 5-32 and 5-33) Altered Air and Life.

REMEMBER WHEN WE COLLECTED EXHAUST? WE COLLECTED CAR EXHAUST IN A JAR TO SEE IF PLANTS COULD LIVE IN THE JAR WITH THE EXHAUST. WE ALSO TESTED CAR EXHAUST AT SEVERAL DISTANCES FROM THE TAILPIPE. MARK AN X TO SHOW YOUR OPINION OF THESE ACTIVITIES.

QUESTION 25 ASKS, "WHY ARE PEOPLE SO CONCERNED ABOUT AIR POLLUTION?" THINK OF THE ACTIVITIES WE HAVE DONE AND WRITE YOUR ANSWER IN THE SPACE.

24. (Activity 5-35) Review of Unit V.

NOW WE HAVE HAD A REVIEW OF UNIT V. THINK ABOUT WHAT WE HAVE DONE AND MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

Collect Worksheet 5-23. Tell the class that tomorrow they can talk about the answers to the questions on the five worksheets. Then if they want to work again on any activity they talked about today, they may do so.

After class, turn to the Responsibilities and Accomplishments Section of the Student Record of Progress and enter your judgment of each student's interest and involvement in science. Then, use an extra set of worksheets for Part I to tally the student ratings of each of the activities.

Look for the most popular and least popular activities. Then look over each worksheet to find out which students indicated the least interest in science. Compare this with your own ratings of each student's interest.

If you have students who frequently indicated disinterest, dislike, or no memory for a number of activities, it is possible that they are trying to indicate personal,

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
5-32 and 5-33) Altered Air and Life.	
EN WE COLLECTED EXHAUST? WE COLLECTED IN A JAR TO SEE IF PLANTS COULD LIVE WITH THE EXHAUST. WE ALSO TESTED CAR SEVERAL DISTANCES FROM THE TAILPIPE. D SHOW YOUR OPINION OF THESE	--mark X's in the appropriate opinion columns.
ASKS, "WHY ARE PEOPLE SO CONCERNED DLLUTION?" THINK OF THE ACTIVITIES E AND WRITE YOUR ANSWER IN THE SPACE.	--write why people are concerned about air pollution.
-35) Review of Unit V.	
HAD A REVIEW OF UNIT V. THINK E HAVE DONE AND MARK AN X TO PINION OF THIS ACTIVITY.	--mark X's in the appropriate opinion columns.
5-23. Tell the class that tomorrow out the answers to the questions on the Then if they want to work again on any ked about today, they may do so.	
to the Responsibilities and Accomplish- the Student Record of Progress and enter each student's interest and involvement , use an extra set of worksheets for he student ratings of each of the	
popular and least popular activities. ch worksheet to find out which students st interest in science. Compare this ings of each student's interest.	
nts who frequently indicated disinterest, mory for a number of activities, it is y are trying to indicate personal,	

MATERIALS

TEACHING STRATEGIES

social, or emotional problems rather than simply that they don't like science. Bear in mind that part of the problem might be you -- a personality conflict that may not be easily resolved. Whatever the cause, these students need attention and understanding. Look at your records of background and understanding for clues. Visit their homes. Review their school placement. In the next unit try to draw them into the activities.

Use the guidelines that follow (preceding Part II of this activity) to summarize and record responses to the Questions on Worksheets 5-19, 5-20, 5-21, 5-22, and 5-23. As you record the results, write occasional comments or words of praise on the worksheets (which should be returned to the students the next day).

Guidelines for Scoring Worksheets 5-19, 5-20, 5-21, 5-22 and 5-23.

The outline below will assist you in scoring student responses on Tallysheet 5-10.

Questions 1, 8, 9, 10, 11, 15, 17, 19, 20, and 21: Circle the letters that each student marks.

Question 2: Circle the number of water uses each studen lists. Circle M if the student lists more than six uses

Question 3: Circle YES if the student writes drinking a the most important use. Circle NO if the student lists another use or fails to answer.

Question 4: Circle YES if the student's response mentions one of the following: watering lawns, using washing machines (clothes or dishes), or washing cars.

TEACHING STRATEGIES

ional problems rather than simply that
science. Bear in mind that part of the
you -- a personality conflict that may
solved. Whatever the cause, these
tention and understanding. Look at
background and understanding for clues.
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w will assist you in scoring student
lysheet 5-10.

9, 10, 11, 15, 17, 19, 20, and 21:
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if the student lists more than six uses.

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ails to answer.

cle YES if the student's response
the following: watering lawns, using
(clothes or dishes), or washing cars.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES

Question 5: Circle YES if the student has written main water pipe, water main, water hookup, water pipe, or another similar answer.

Question 6: Circle YES if the student circled the treatment plant and a natural water source and numbered the glass first, the natural source last, and the treatment plant between. (All other circled and numbered words may be disregarded for scoring purposes.)

Question 7: Circle YES if the student answered that the bleach was added to kill microbes.

Question 12: Circle the number of items that the student matched correctly.

Question 13: Rate each student's responses to this question based on the following criteria:

1. The location of the two cities (one near the mountains, one near the ocean.)
2. A river flows between the two cities.
3. Oceanview has strong pollution laws, keeps city clean, and so on.
4. Mountainview polluted the clear river.
5. Mountainview's pollution has affected the city of Oceanview.

Rate students as HIGH if they mention all five items. Rate students as SOME if they mention three or four of the items. Rate students as LOW if they mention less than three of the items.

Question 14: Circle the answer that the student marked on his sheet.

TEACHING STRATEGIES

cle YES if the student has written main r main, water hookup, water pipe, or answer.

cle YES if the student circled the treat- natural water source and numbered the natural source last, and the treatment (All other circled and numbered words ed for scoring purposes.)

cle YES if the student answered that the to kill microbes.

rcle the number of items that the student y.

te each student's responses to this n the following criteria:

on of the two cities (one near the one near the ocean.)

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has strong pollution laws, keeps city so on.

w polluted the clear river.

w's pollution has affected the city w.

HIGH if they mention all five items. SOME if they mention three or four te students as LOW if they mention f the items.

cle the answer that the student et.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Question 18: Circle YES if students respond that inhale air has mostly oxygen in it and exhaled air has mostly carbon dioxide.

Question 22: Circle YES if the student marks an X on al choices. Circle NO if he fails to mark any choices.

Question 23: Circle YES if you feel the student's response indicates an understanding of at least one reason people are concerned about air pollution.

Guidelines for Recording in the Student Record of Progress:

The items in this review assess an understanding of the concepts in this unit. Some assess a higher level of abstract thinking and are used to identify the students who have developed these reasoning skills.

The following instructions will help you interpret score and record results from the review in the Student Record of Progress:

Question Number 1 assesses the student's understanding o the concept of the water content of living things. Turn to the concept page in the Student Record of Progress and find the column marked Activity 5-35, Water Content. Circle YES if the student marked A.

Questions Number 2 and 3 assess the student's understanding of concepts regarding water use. Find the column marked Activity 5-35, Water Use, on the concept page of the Student Record of Progress and circle YES if the student lists at least four water uses and names drinking as the most important way he uses water.

Question Number 4 assesses the student's understanding o the concept of saving water. Find the column marked Activity 5-35, Saving Water, on the concept page of the Student Record of Progress and circle YES if YES is circled on the tallysheet. A YES indicates that the student has at least some understanding of the concept.

TEACHING STRATEGIES

Circle YES if students respond that inhaled
y oxygen in it and exhaled air has mostly
e.

Circle YES if the student marks an X on all
cle NO if he fails to mark any choices.

Circle YES if you feel the student's
cates an understanding of at least one
are concerned about air pollution.

r Recording in the Student Record of

this review assess an understanding of the
his unit. Some assess a higher level of
king and are used to identify the students
loped these reasoning skills.

instructions will help you interpret scores
sults from the review in the Student Record

er 1 assesses the student's understanding of
f the water content of living things. Turn
t page in the Student Record of Progress
column marked Activity 5-35, Water Content.
the student marked A.

ber 2 and 3 assess the student's under-
oncepts regarding water use. Find the
Activity 5-35, Water Use, on the concept
tudent Record of Progress and circle YES
t lists at least four water uses and names
he most important way he uses water.

er 4 assesses the student's understanding of
f saving water. Find the column marked
, Saving Water, on the concept page of the
d of Progress and circle YES if YES is
e tallysheet. A YES indicates that the
t least some understanding of the concept.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Questions 5 and 6 assess the student's understanding of the concept of the source of water. Find the column marked Activity 5-35, Water Source, on the concept page of the Student Record of Progress and circle YES if YES is circled for both Questions 5 and 6 on the tallysheet. A YES indicates that the student understands the source of his water.

Questions 7 through 11 assess the student's understanding of the concept of water treatment. Find the column marked Activity 5-35, Water Treatment, on the concept page of the Student Record of Progress and circle HIGH if YES is circled for Question 7 on the tallysheet and if the student marked all of the correct alternatives for Questions 8 through 11. Circle LOW if NO is circled for Question 7 or if the student marks any incorrect responses for Questions 8 through 11. Circle SOME if YES is circled on the tallysheet for Question 7 and if the student marked some of the correct alternatives for Questions 8 through 11 without marking any incorrect answers. Students who are rated as LOW in understanding of this concept should be exposed to more activities and experiences regarding water treatment.

Question 12 assesses the student's understanding of the concept of the natural water cycle. Find the column marked Activity 5-35, Water Cycle, on the concept page of the Student Record of Progress. Circle HIGH if the student matched all three of the parts of the water cycle. Circle LOW if he didn't match any correctly. Circle SOME if he matched one correctly. Students who were rated as LOW should be provided with further activities to aquaint them with the water cycle.

Question 13 assesses the student's recall of the story, *Fate of the River*, and their understanding of the concept of water pollution. Find the column marked Activity 5-35, Fate of the River, on the concept page of the Student Record of Progress. Record the rating you recorded on the tallysheet. Students who were rated LOW will need

TEACHING STRATEGIES

6 assess the student's understanding of
he source of water. Find the column
5-35, Water Source, on the concept page
ecord of Progress and circle YES if
or both Questions 5 and 6 on the
ES indicates that the student understands
s water.

ugh 11 assess the student's understanding
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5-35, Water Treatment, on the concept
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didn't match any correctly. Circle
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ld be provided with further activities
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, and their understanding of the concept
n. Find the column marked Activity 5-35,
, on the concept page of the Student
s. Record the rating you recorded on
Students who were rated LOW will need

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

many opportunities to listen to or read stories and then to recall the main points.

Question 14 involves a value judgment and will not be recorded in the Student Record of Progress. All student should, however, be given many opportunities to make value judgments regarding a variety of concepts and ideas.

Question 15 assesses the student's understanding of the concept of population and water. Find the column marked Activity 5-35, Population and Water, on the concepts pag of the Student Record of Progress. Circle HIGH if the student marked all of the choices A, C, and D. Circle LOW if the student marked B. Circle SOME if the student marked any of the choices A, C, or D and did not mark B. Students rated LOW should be given further experienc relating to this concept.

Questions 16 and 17 assess the student's understanding of the need for oxygen. Find the column marked Activity 5-35, Oxygen, on the concepts page of the Student Record of Progress. Circle YES if the student answered both Questions 16 and 17 correctly.

Questions 18 and 19 assess the student's understanding o the concept that plants and animals use and give off oxygen and carbon dioxide. Find the column marked Activity 5-35, Oxygen and Carbon Dioxide. Circle YES if YES has been circled for Question 18 on the tallyshee and the student has marked choices C and D for Question 19.

Question 20 assesses the student's understanding of the concept of air pressure on weather. Find the column marked Activity 5-35, Air and Weather, on the concepts page of the Student Record of Progress. Circle YES if the student marked Choice B. NOTE: This is a very difficult concept that involves some abstract reasoning abilities. Students who did not grasp the concept will require a large number of experiences in abstract thinking before reaching this developmental level.

TEACHING STRATEGIES

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on the concepts page of the Student Record
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e reaching this developmental level.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	**TEACHING STRATEGIES**

Question 21 assesses the student's understanding of the concept of the influence of wind and water on air. Find the column marked Activity 5-35, Wind and Water, on the concepts page of the Student Record of Progress. Circle YES if the student marked Choice B. Students who do not grasp this concept should be given another opportunity to perform the experiment of blowing air over water on their skin.

Question 22 assesses the student's understanding of the concept of things in the air. Find the column marked Activity 5-35, Things in Air, on the concepts page of the Student Record of Progress. Circle YES if YES has been circled on the tallysheet. Students who have not grasped this concept of things in the air should be given additional attention and activities to develop this concept.

Question 23 assesses the student's understanding of the concept of air pollution. Find the column marked Activity 5-35, Air Pollution, on the concepts page of the Student Record of Progress. Circle YES if YES is circled on the tallysheet. Students who have marked NO should be given individual attention regarding air pollution. All students may require many opportunities to express themselves in writing.

Part II.

As you return the worksheets from Part I to the students, congratulate them on what they have learned. Then project Slide 5-71 and say:

> FOR A LITTLE WHILE LET'S TALK ABOUT THE QUESTIONS YOU ANSWERED. AS WE GO ALONG, I WILL TELL YOU WHICH ACTIVITIES WERE THE MOST POPULAR. YOU CAN CHOOSE A FEW FAVORITES TO DO AGAIN IF YOU WOULD LIKE.

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fluence of wind and water on air. Find
Activity 5-35, Wind and Water, on the
the Student Record of Progress. Circle
t marked Choice B. Students who do not
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Progress. Circle YES if YES is circled
. Students who have marked NO should be
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ire many opportunities to express them-
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WHILE LET'S TALK ABOUT THE
U ANSWERED. AS WE GO ALONG, I
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. YOU CAN CHOOSE A FEW
DO AGAIN IF YOU WOULD LIKE.

ACTIVITY
5-35

MATERIALS

TEACHING STRATEGIES

NOW LOOK AT QUESTION 1. WHO WANTS TO TELL THE ANSWER?

**GIV
STUDE
TO**

Check the answer on the chalkboard image of Slide 5-71, then fill in the number of students who marked each opinion.

If, for Question 1 or later questions, some students have a reasonable justification for an answer that you had scored incorrect, be sure to change your rating and praise their good thinking. Some students may like to refer to their worksheets in their student folders as th different questions are discussed.

Discuss each of the questions, and the popularity of the activity from which it was drawn, for Worksheets 5-19 through 5-23, projecting the slides of the appropriate worksheet.

Refer to the guidelines for scoring the worksheets for acceptable answers to each question. Encourage the students to challenge and question one another's answers.

For Question 2, allow every student to tell what water uses he remembered.

For Question 3, allow students to explain why they chose the water use they listed as being most important.

For Question 4, discuss the ways to save water that each student listed. Encourage them to explain why it would save water.

TEACHING STRATEGIES

QUESTION 1. WHO WANTS TO TELL

on the chalkboard image of Slide 5-71,
number of students who marked each

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ey listed as being most important.

discuss the ways to save water that each
Encourage them to explain why it would

**GIVE SEVERAL
STUDENTS A CHANCE
TO RESPOND**

ANTICIPATED STUDENT BEHAVIORS

Students should:

--raise hands to explain that most living things are more than one-half water.

MATERIALS

TEACHING STRATEGIES

For Question 5, discuss the answers students gave and have them again explain the source of water to the house.

For Question 6, discuss each word listed and why it is or is not a part of the route our drinking water takes.

While discussing Question 7, ask students what bleach does to the microbes, and what other ways there are to kill microbes.

For Question 8, have students explain why each choice would or would not apply to Johnny's problem.

For Question 9, review the experiment done in Activity 5-12 and discuss why it would be harder to clean the water with plants in it and why more plants would grow in the water.

In discussing Question 10, have students think of other ways to keep oil out of the water supply.

In discussing Question 11, review the distillation process with the students. It might be helpful to draw Diagram 5-6 on the chalkboard to help students remember the demonstration. Also discuss why the other choices would not take the salt out of the water.

Display Chart 5-2, the *Water Cycle in Nature* while discussing Question 12. Praise any student who was able to match all three definitions correctly.

While discussing Question 13, allow each student who wishes to repeat his explanation of *Fate of the River*.

For Question 14, ask each student to explain and defend why he answered YES or NO. Explain that there is no correct answer for this question because each person has his own opinion.

EACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

scuss the answers students gave and
plain the source of water to the

scuss each word listed and why it is or
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n.

MATERIALS

TEACHING STRATEGIES

While discussing Question 15, it might be helpful to project Slides 5-29 through 5-34 of the graphs to help the students remember their significance.

For Question 16, be sure students are able to explain wh the fish couldn't get enough air.

Discuss the other answers to Question 17 and why they would not be correct.

While discussing Question 18, it might be helpful to review Worksheet 5-12 on the components of inhaled and exhaled air.

Praise any students who answered Question 19 correctly, as it was a difficult concept to grasp. Review the snai and plant experiment while discussing the question.

For Question 20, discuss what the weather would be like if high pressure were moving in.

For Question 21, have students explain why wind cools something that is wet.

For Question 22, be sure students recognize all of the things as sometimes being in air. Encourage students to name other things which may be found in air.

For Question 23, discuss all the reasons given by the students. If there is disagreement among the students, allow them to defend and discuss their answers. Don't interfere.

TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have participated in a review of Unit V.
--have responded to Worksheets 5-19 through 5-23.
--have participated in a discussion of answers too the question on the worksheets.

UNIT V, CORE G
ACTIVITY 5-35

Teacher ____________

Activity name suggested by class:

BSCS USE: Post ___ Tally ___ Rev ___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ____________ Comment:

Specific Questions:

12. What do you feel has been the students' general reaction to assessment activities?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any parts of this activity? ☐ Yes ☐ No -- Identify which parts were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. What do you feel has been the students' general reaction to assessment activities?

13. How would you improve assessment activities?

UNIT V, CORE G
ACTIVITY 5-35

Teacher ______ ______

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff. (We will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

UNIT V
REACTIONS TO CORE G

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core? ☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
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10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

NEW STUDENTS ENTERING DURING THIS C

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Te
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-American
O = other

W=WIS
B=Bir
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

oup	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
D	M F			W B O				
D	M F			W B O				
D	M F			W B O				
D	M F			W B O				
D	M F			W B O				
D	M F			W B O				

W=WISC
B=Binet
O=Other
(Name)

sh-
can

on for Dropping